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THE
JOURNAL

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ROYAL HORTICULTURAL SOCIETY
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JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

- I. New Observations on some Artificial Agents which promote the ripening of Figs. By G. GASPARRINI. Extracted from Vol. ii. of the Transactions of the Royal Academy of Physical and Mathematical Science. Naples, 1865.

I HAVE at various times published several memoirs on the Fig and Wild Fig, two individuals, male and female, of the same species. My researches related principally to the structure and formation, as well of the receptacle as of the different constituent parts of the flower and fruit, to the insect which lives and is propagated in the ovary of the Wild Fig, to the practice and effect of caprification in this country, and to the origin of the germinal embryo, &c. No other tree, perhaps, whether indigenous or exotic, offers, at least as far as my experience extends, equal or greater difficulties. The process of ripening also has its own peculiarities. Two years ago, therefore, I read before the Pontanian Academy a certain number of observations on these subjects, which were printed*.

In that memoir, as far as it related to the mere process of ripening, I treated on the nature and variety of colouring which the fruit acquired as it approached maturity, the organic modifications which take place in the different tissues, on the origin of

* "On the Ripening and Quality of the Figs in the Neighbourhood of Naples" (1863), printed in the 9th volume of the Transactions of that Academy.

the sugar*, and on an infusorium of the genus *Anguillula*, which infested the cynips of the Wild Fig in the eatable varieties. I touched also on the agents which, under given circumstances, are capable of accelerating the ripening, distinguishing the natural from the artificial. The natural agents are heat, light, water, soil, with the functions which depend upon them, as exhalation, respiration, and nutrition in general—in a word, those agents which sustain life—according to the intensity with which they operate, and the time during which their action lasts, influencing or retarding the maturity, and making it more or less perfect.

The Neapolitan cultivators, and those in other parts of Italy, hasten artificially the ripening of the figs by the process called, improperly, "puncturation," which consists in anointing the mouth of the fig with a very small quantity of oil when it has arrived at a certain size, when the flowers contained in it have become pink, and the scales are a little raised. The maturation is advanced by it about ten days. No one has found out how the olive-oil operates in this case, as far as I am aware; whilst on other parts of the same tree, and especially on the leaves, it operates as a poison. Twenty years ago, when treating on caprification, in distinguishing the effect of the cynips from that of the oil, I came to this conclusion, "the oil operates on the fig in a manner unknown to me; placed on the mouth of the fruit, it contracts as the oil gradually spreads, and the green colour changes. It appeared to me that such a substance could not alter the latex, but might impede the exhalation and the other functions of the cuticle, as well with respect to the light as to the air, and that by these means the anointed fig begins to ripen from the base, and the taste is in consequence not so good as that of those which

* With regard to the origin of the sugar, I stated that the principal source of that substance is the starch in the parenchyma, not in the latex, as appears at first sight, since the latex is found in the receptacles as well at perfect maturity as in the same figs when dry. The new researches do not contradict this assertion; but sugar is found, in small quantities, in the latex of many plants, and abounds in *Urostigma Saussurianum*; there is a little in that of the common fig, as appears from Trommer's reagent. Sugar being soluble in water, the milk which is mixed with it forms a deposit at the bottom of the cup, and the liquid part, passed through a filter, and treated with the above reagent, after being boiled a short time, shows the presence of sugar, which exists in the fluid part in the organic composition of the milk, not in the sediment, which remains unaltered at perfect maturity. But that small proportion of sugar could never represent the enormous quantity in the ripe fig.

ripen naturally." This explanation was reproduced two years ago in the memoir cited above, with additional reasons. I denied that this liquid could act as a ferment by communicating to the cellular mass a special excitement or decomposition from which a precocious maturity might be derived. I was inclined to recognize in what followed, on anointing the mouth of the fig, a certain relation to that of the effect of the pollen on the stigma. This part, having come into contact with the pollen, becomes tender and dies in a short time—a circumstance which conduces, at least in some measure, to the increase of the subjacent ovary.

The particulars were given of some experiments undertaken with a view of ascertaining whether other substances had the property of promoting in the same manner the maturation of figs. The result was, that oil of almonds, train-oil, nut-oil, linseed-oil, castor-oil, codliver-oil, lard, and butter operated in the same way as oil of olives. Finally, the milk of the Caper-Spurge (*Euphorbia Lathyris*), applied to the mouth of the Sardinian Fig, gave more or less the same result.

Vinegar and turpentine were without effect. The almost uniform efficacy of the fatty materials above mentioned appears clear, on estimating these experiments, when applied, not to the body of the fruit, but only to the mouth. It appears, therefore, that this part is more sensitive to the agents adopted; and this sensitiveness resides in the little leaves or scales with which the mouth is furnished. Some experiments made on melons, pears, and pomegranates with some of the above substances were without effect.

Having published the memoir, and not being satisfied with these observations with respect to the operation of the oil and other fatty materials, on thinking over the subject, I perceived that I had not taken into consideration an important circumstance, viz. that the first effect of the application being the augmentation of the volume of the receptacle, this could not really happen if, as I suspected, the oil disturbed or impeded the functions, especially those of exhalation or respiration—and that, if this were the case, the phenomenon would take place more easily if the substance which promoted the maturation were applied to the whole surface.

In consequence I repeated the experiments last year, with the addition of certain variations. On the 22nd of August I anointed with olive-oil the body of some fruit of the Sardinian Fig, the Tintore, the Winter Fig, and others, leaving the mouth

untouched; and they underwent no change, nor ripened prematurely; while fruit of the same trees, in a similar condition, anointed at the mouth, first increased in size, and then became ripe in ten days. Oil spread over the whole upper surface of the leaves, or over a certain portion of it, caused them to die in a few days; and some drops of the same fluid, sprinkled here and there, altered sensibly the corresponding parenchyma, which turned brown and then dried up. The experiments repeated on the 8th of August with the same oils and fatty matters which were used in 1863, anointing only the mouth of the more developed figs at the base of the shoots of the current year (*pedagnuoli*), gave the same result in the space of from eight to ten days; that is to say, all (or some portion at least) attained twice the size, or more, became tender, and in some instances arrived at perfect maturity. Goat's milk and turpentine were without effect, exactly as tincture of iodine and solution of potash. Pure alcohol had little or no effect, perhaps because of its volatility. Other experiments, made on the 19th of August, on the White Fig, gave the same result. Of three fruits anointed with castor-oil, two ripened prematurely, as did two out of four anointed with hog's lard, two of five with fat, all anointed with butter, one only out of three anointed with linseed-oil, three out of six with oil of almonds, one only out of five with nut-oil, five out of six with oil of olive. Of the Brogiotto Fig, a single one out of five treated with tincture of iodine attained double the size, and split when beginning to become tender; the same effect was produced by pure alcohol and a solution of potash, on the same number of receptacles; of four treated with goat's milk, two, which had increased to double the size, remained green and hard. Ammonia was without effect. Of four receptacles slightly touched with azotic acid at the mouth, one only increased in size and split; the remainder, with the scales shrivelled by the acid, presented no change. The facts, therefore, observed in 1863 on the more or less active power of certain oils and fatty matters to promote the increase and hasten the maturity of figs within the term of about ten days, were confirmed in the current year.

On the 21st of August, on different branches of the same tree, belonging to the variety Imperial Brogiotto, eight receptacles were anointed at the mouth with mineral tar amalgamated with oil of almonds, the same number with petroleum, four with a mixture of sugar and flowers of sulphur, all which, after four days, were

advancing to maturity. The variety of mineral tar known in commerce under the name of "black" had the same effect in three fruits out of four. Some, however, were unaffected by the olive-oil, of whose agency in promoting maturation there is no doubt. Of six bathed with sugar and water, and five with carbonate of ammonia, a single fruit of each was a little increased in size within the same period. Five anointed with plaster mixed with lard were in like manner a little enlarged; four anointed with honey, a single one became ripe, and another made some progress; five treated with sulphate of ammonia, and the same number with nitrate of copper, remained in the same state in which they were on the 21st of August, when I began the experiment. On the same day I bathed the mouth of six fruits from the base of the current year's wood of the Winter Fig with a little hydrochloric acid; and on the fourth day all were twice as large, and began to get soft and ripen.

The like action of sulphuric acid was recognized by repeated experiments in the course of August and part of September. The sulphuric acid of commerce, lowered with two parts of water, brought a certain number of the Tintore and Paradise Fig to perfect maturity, with little variation, in the space of eight days; and out of five Winter Figs, after three days, three were enlarged and approached maturity. With four parts of water the acid gave the same result, in the Paradise Fig, in two receptacles, as if they had been greatly excited; but two others, after enlarging a little, split without changing colour or becoming tender in any part. In consequence, I wished to proceed with more precision when employing the same acid lowered with three, six, and nine parts of water. The mouth of four receptacles of the Sardinian, White, and Brogiotto Fig was anointed with each of these liquids, thirty-six in all; and in about three days they became double the size and approached maturity. The mouth of five unripe figs of the Imperial Brogiotto variety was touched with the sulphuric acid of commerce lowered with two parts of water; and three of these on the eighth day were twice as large, and split at the base into two or three parts; their cuticle had become violet, their flowers deep red, the pulp tender, but with little flavour, as is the case also with receptacles which split naturally. The scales of the mouth, moreover, became tender, and, as it were, sodden with the acid. A fourth, without enlarging or changing, also split into two parts at the apex; the fifth became three times as large, was

sound, with the skin violet inclining to green, the mouth closed, while the scales in like manner became tender and dead. At the end of eleven days, one of the three first (which was split) showed signs of decomposition, and was covered with mould belonging to the genus *Ascothoria*; the other two were still sound, but very dry, with some more tender spots, accompanied by a small quantity of sweet liquid. The fourth, with respect to size and colour, remained unaltered, only the fissure had become deeper; the fifth, sound and without lesion, became tender and perfectly ripe, had the mouth closed, and above it was a large drop of sweet liquid. All the pulp had become tender, soft, and delicate, and abounded with sweet moisture down to the very stalk. The taste did not differ in any respect from that of a fig naturally ripened; the latex was in such abundance in its proper vessels that they appeared swollen, and quite full of spherical and large but irregular granules. It did not appear that the sugar, or any part of it, was derived from the milky fluid; no particular matter appeared in the cells of the pulp; and the contents of the vessels of the latex became of a reddish yellow with tincture of iodine. The sulphuric acid had killed, but had not decomposed, the scales. Finally, all the mass of the fruit appeared more juicy than in others in the same state of ripeness.

With the same quantity of acid, the experiment was repeated on many green receptacles of the Paradise Fig and of the Imperial Brogiotto, in a fit condition for trial, and the result was the same as before: after two days they became more than twice as large, and split nearly halfway down, or sometimes at length to the base. The peduncle, the perigonium, and the carpel of each internal flower was red, but more so in the Brogiotto, the skin of which, being greatly extended, was coloured of a greenish violet; the pulp, always white, when open, gave out here and there drops of milk, which were observed again along the margin of the deep and irregular fissure, which remained quite green. In these two open receptacles, the solidity of the pulp and of the flowers, the absence of sweetness, and the shortness of time in which the increase took place, were especially remarkable. The splitting was the final effect on the night before August 20, when the examination took place. There is clearly a rankness of vegetation in all the constituent parts of the receptacle, especially those which are internal, whose force the cuticle is unable to resist, and in consequence splits.

On the 18th of August, the mouth of similar green fruit, in a proper condition for experiment, of the Tintore, was washed with sulphuric acid lowered with about four parts of water. On the morning of the 20th they were about double the size (some more, some less), without any fissure, the pulp firm and milky, the flowers red, the seeds with perfect embryos, and no sugary moisture in any part. Granules of a sugary appearance were seen here and there on the withered scales and within the rim of the mouth, which I noticed before in the split receptacles of the Brogiotto and Paradise Figs above described. This substance came out in the form of a liquid, when the mouth was first touched with the acid, and then condensed in the form of sugar; but it has no sweet taste, it is not soluble in water, and is rather viscid to the touch. It is derived probably from the action of the sulphuric acid on the globular matter of the latex. It appears, therefore, that the sulphuric acid, more or less lowered, must be regarded as capable of exciting the vegetation of the fruit of the Fig.

This unexpected effect of the sulphuric acid and hydrochloric acid, the action of the oils and fatty matters used in the experiments (which, acted upon by the air, easily became acid), and the inefficiency of the solution of potash and the turpentine have demanded new proofs in the current year. With a view to see comparatively and with greater precision the operation of certain acids and neutral substances, and also of some alkaline matters, I began with sulphuric acid lowered with a definite quantity of water—5, 10, 20, 25, 50, 100, 150, 200, 300, 500 parts to one part of acid.

Taking three varieties of figs, the Brogiotto, Sarnese, and Andreone, I anointed the mouth of twenty receptacles with acid lowered with five parts of water; and all on the ninth day were in various states of maturity; six were split, and the rest entire. The action of the acid appeared clear on the second day, as the fruit was nearly twice as large, and some had already begun to split.

Sixteen figs treated with acid lowered with ten parts of water gave almost the same results, with slightly diminished energy, which may have depended on the small quantity of the liquid remaining on the mouth, in consequence of the hanging down of the branches or some other cause. With twenty parts of water, out of sixteen, thirteen arrived at perfect maturity, two of which split in the course of ripening: in the other three no action was

manifested. The acid, with twenty-five parts of water, gave nearly the same result; for of sixteen figs, ten ripened, one of which split, three increased in size, and three remained *in statu quo*. With fifty parts of water, eight figs ripened without splitting, one split, and seven were more or less near ripening. With one hundred parts of water, out of eighteen unripe fruit, in a week or a little more, six ripened perfectly, eight increased and approached maturity, while four remained as at first. With one hundred and fifty parts of water, out of three fruit of the Sarnese and four of the Brogiotto, no effect was produced; while, on the contrary, three of the Andreone ripened, one of the Papa figs split, three others ripened, and one remained inactive, fifteen in all. Out of nineteen figs treated with acid lowered with two hundred parts of water, one ripened, three approached maturity, and the rest remained unaltered. With three hundred parts of water, two ripened, four almost ripened, and nine showed no change. With five hundred parts of water, the acid had no effect on twelve of the Sarnese and Brogiotto Figs; but three of the Papa Fig ripened, and another almost ripened: but the vegetative condition of the Andreone, rank, young, and full of life, and, in a word, sensitive to every little stimulus, was not proportionate to that of the other two, which were old and almost exhausted. This second series of experiments on the action of sulphuric acid always proved, with more or less precision, its exciting power in promoting the anticipation of maturity in the fig.

Carbolic acid operates so fatally on the receptacle of the fig that, wherever it is applied or is spilled, the green colour in a very short time disappears, the subjacent tissue dries up, and becomes of a yellowish white, and then blackish; the scales of the mouth become hard, and afterwards acquire a reddish-brown colour. All this takes place in two or three days; but frequently, when the acid has been able to remain for some time, generally about the third day, moulds begin to appear on the decayed part, amongst which is a conidiiferous form, very near *Alternaria tenuis*, belonging perhaps to *Pleospora herbarum*, but very fragile. In the meanwhile the portion of the receptacle which is free from the immediate action of the acid, increases, becomes tender, acquires its own natural colour of maturity, in short, ripens prematurely at least ten days earlier than it would have done by natural means only. Out of twenty fruit, fourteen were

perfectly ripe, some split, the others increased greatly and approached maturity. We are quite ignorant how the carbolic acid acts, whether all is the result of the mere act of growth, or the ripening of the free part is owing to its immediate action. If we take a thin slice of the receptacle, commencing with the cuticle, and expose it upon glass to the action of the acid in question, it attacks and destroys suddenly the contents of the innermost cells, which are the most tender, dilates them, and forms a mucous stratum, so as to make it appear that they are decomposed; but on washing them we see that they are still entire. The effect is gradually less towards the cuticle, which becomes more rigid. A little lamina, taken from the parenchyma of the inferior surface of the leaf, having hairs or nervelets, submitted to the action of the carbolic acid, undergoes the following change:—The contents of the more tender cells become more or less decomposed, the chlorophyll resists, but changes its green tint into a yellowish red; the younger cellular membrane becomes puffed up; the cuticle remains unaltered; the hairs swell a little, without bursting. The crystals (cystoliths) at first appear more distinct, then by degrees, but after many hours, are dissolved. No notable action takes place on the membrane of the spiral or fibro-cellular vessels.

Formic acid is less active than carbolic; it likewise dries up the part on which it is spilled, and makes it brown, though slowly; the scales become rigid; but the dead part does not become mouldy in the course of ten days. Out of twenty-four receptacles, on the tenth day, three were ripe, seven nearly so, seven had increased in size, the others remained as they were at the commencement of the experiment.

Tartaric acid brought to perfect maturity twenty-five fruits, belonging to four varieties, when applied to the mouth; and in a short time (that is to say, within the space of a week) five among them were split. The efficacy and speed of the operation of this acid does not admit of any doubt, the experiment having been repeated many times with the same effect. Lowered with a very little water, and applied to the mouth of the fruit, it first softens the scales and then dries them, promotes, for some distance from the place where it spreads, the issue of some little drops of milk, which afterwards condense into globules of a gummy aspect, on which a little mould frequently springs up. Among the many substances which promote the ripening of the fig, this acid alone

appears to us preferable to common oil, from the certainty and speed of its operation.

I cannot assert anything with certainty respecting the action of stearic acid, as it is not soluble in water. Dissolved in ether it had no effect on four receptacles; and out of sixteen others, when mixed with water, it promoted in some premature ripeness.

Four receptacles anointed with collodium, as many with petroleum, four others with benzoic acid, were all ripe on the ninth day. Beer-yeast brought two out of four to maturity; and pepsine did the same. Gallic acid ripened two out of three, acetic acid three out of four, oxalic acid four out of five, acetate of iron two out of four.

Sulphate of iron showed little effect on five fruits bathed at the mouth; three of these in the course of ten days were near maturity, two only increased in size; but in another experiment on three receptacles, on the fifteenth day they were over ripe and, as it were, decomposed. Still less effect was produced by sulphate of copper, which, in the same space of time, was reduced to the mere enlargement of the few fruits to which it was applied. A single fruit out of four ripened with sulphate of potash; and with chloride of calcium four ripened out of seven.

Chloride of potassium had a very weak effect on three fruits, one of which only increased in size; iodide of potassium, tincture of iodine, and lime-water, applied to various figs, gave more or less the same result. Azotic and hydrochloric acid, repeatedly applied, always promoted ripening, although with less speed and efficacy than sulphuric acid. Also arsenious acid in seven days caused two fruits out of three to ripen, and caustic ammonia one out of the same number. Flowers of sulphur applied to the mouth of the fig did not adhere, and therefore had not time to manifest its efficacy, supposing it had any; but when mixed with glycerine, an inert substance as regards this subject, out of four fruits anointed at the mouth, after ten days one was ripe and two nearly so. I bathed the mouth of twenty figs with pancreatic juice; and on the tenth day one only was ripe, eight were enlarged and nearly ripe, the rest remained *in statu quo*. This very weak effect is apparently not attributable to pure pancreatic juice, but rather to a very small quantity of hydrochloric acid, which is mixed with it, though only in the proportion of a thousand to one, according to the authority of Professor Schiff, from whom I procured the liquid. Last year I wished to see if burning or scalding the scales by introducing a red hot iron into the

mouth would promote the ripening. The three fruit which were submitted to the experiment remained unaltered. But the same experiment repeated this year had the contrary effect.

The following substances were inefficacious in such fruit as were submitted to their action:—glycerine in twenty-two parts of sulphate of soda, eight of English salt, nine of sulphite of carbon, six of saltpetre, seven of solution of tannin, nine of common salt or chloride of sodium, nine of carbonate of ammonia, and three of solution of potash in four parts of glycerine.

Such is the result of the new experiments made in two successive years, in August and the first half of September. The best time, however, in the climate of Naples is from the end of July through the whole of August, which is the time in which, for the most part, the fruit of the Fig is, as it were, stationary, or, so to speak, in the act of growing, while in September they ripen successively in great numbers—so that the criterion is not to be trusted whether they ripen naturally, or whether the maturation is promoted by other agents. If, considering their variety and their almost uniform effect, we wish to arrive at a certain or probable explanation of the intrinsic manner of their action, it would be necessary above all to ascertain the most important circumstances which take place in the short period in which artificial ripening is completed, in distinction from the natural maturation. The more notable points, in my opinion, and the most tangible, are few, and reducible to four.

1. In natural maturation, while the fruit grows and softens, no material alteration appears to the eye in the scales which close the mouth, nor do they become hard, or tender, or change colour; they remain fresh and perfect till decomposition takes place.

2. On the contrary the oily fatty liquids, fat, unctuous, solid matters, the acids, almost everything which has the power to accelerate maturation, induces at first a sensible alteration in the scales, making them tender, causing them to become brown, from green to become reddish, then to dry up and wither,—effects which are not produced by the neutral substances, as glycerine, chloride of sodium, nitrate of potash, and the others above mentioned.

3. The effects of acids are manifested only when applied to the mouth of the fig; they are quite inert on any other part of the receptacle.

4. In the same manner, the oils and fatty matters produce a premature ripening only when applied to the mouth, being inert

in every other part of the fruit. And since such substances are changed more or less easily by the contact of air, as has been already noticed, and thus become acid, we may at any rate assume, at least in general terms, that a certain number of acids, if not all, and those fatty matters which can become acid, promote in the fig an anticipation of maturity.

But how does this act commence? With the increase of the fruit. This increase indicates an excitement in all the organs, communicated by the scales impressed with the potential agent. The most apparent specialities which accompany it are the form, the volume, the colour, the weight which the fruit acquires in the course of ten days. We have said enough, in the memoir published two years since, of the change of colour and the most palpable changes in the elementary organs; and on some specialities we have hinted not long since that we have nothing to bring forward,—the form, for example, in which there is little difference between the anointed fruit when it is unripe and when it is mature. We have not, however, asserted that, under uniform conditions of soil, exposure, age, and the vegetative state of the tree, one variety of Fig is more or less inclined to experience an unnatural promotion of maturity than another.

Heat, light, the nature of the soil, moisture, and the agitation of the air influence the time which the anointed fruit takes to increase and become ripe; but, on an average, maturation occurs in ten days during August and part of September. The early figs also (*fioroni*) at the end of June, anointed with oil at the mouth, ripen prematurely in the same space of time. With respect to volume, it being premised that the fruit increases to double the size, either a little more or less, the ordinary increase begins to appear on the fourth day, and on the tenth frequently exceeds what has been mentioncd. I have but one observation respecting the greater weight which attends the increase of volume. In the Brogiotto Fig, on the eighth of August, some fruits of this year's wood, green and unripe, as far as possible equal in size and like each other, in the form of a top, were 4 centimetres (1·57 inch) high, and three (1·2 inch) in the larger diameter. One of them weighed 15·542 grammes (240 Troy grains). Several were then anointed, and were perfectly ripe at the end of twelve days, with little difference of size: the larger, which had become almost round, measuring in length and breadth 6 centimetres (2·4 inches), weighed 71·75 grammes (1107 grains)—

that is to say, four times as much as in an unripe state, when the oil was applied. The others, to which oil was not applied, had only increased a few millimetres, and were still green, hard, sour, and milky. The tree, moreover, had no ripe fruit, but a few only slowly increasing in size and advancing to natural maturity. Consequently the oil and other exciting substances manifested their power sensibly in the increase both of size and weight; and, it being granted with respect to weight, after the example adduced, that the ratio of 1:5 cannot be considered constant, there remains a great difference of weight at the state of maturity. Difference of weight, whether in natural maturation, or under the excitement of the agents above mentioned, arises only, in great part, from the lymph which flows to the fruit and remains there. It dilates the cells, fills up the cavities, facilitating the transformation of starch into sugar, the development of the chlorophyll into two colouring-matters, yellow and blue, &c.: during these processes there is an exhalation of much carbonic acid at all hours of the day. This appears clear by comparing under the microscope the analogous cells of the different organs and tissues of the unripe fig, when it has been anointed, and in the ripe fig. In the second state they are at least three times as large as they were at the time of anointing. If it be asked whether natural maturation or the excitement of artificial agents has any relation to the formation or increase of the seminal embryo, I must answer negatively. The truth is, that in the height of summer the *pedagnuoli* quite unripe, green, and full of milk, with the luxuriant ruddy florets, possess already the embryo well formed, though tender and ready to be affected by the action of the substances which promote maturation. But they produce the same effect on the *fioroni*, which are always sterile (that is to say, without any seminal embryo), and on the latest fruit (*cimaruoli*), which are likewise sterile.

In conclusion, the experiments of the past year, with respect to the way in which the oil of olive, in the first place, and in the second the other oils and fatty matters, not to mention the sulphuric acid and petroleum, promote maturation, put us in the way of approximating more nearly to the explanation of the phenomenon, establishing, as they do, two important facts. The one is, that the oil does not operate by disturbing on the one hand the respiration, and on the other the normal and free action of light and air on the cuticle, and consequently the aqueous exhalation, blocking up, as it were, the cortical pores (which has not yet been shown by

experiment), and, by penetrating into the subjacent tissue, inducing an alteration in the contents of the cellulcs and milk-vessels, as is supposed; for the inefficacy of the same oil on the whole body of the fruit, where the alleged functions principally take place, contradicts irrefragably this notion. And since the effect is obtained by anointing with oil the mouth of the fig alone, and this liquid spreads around for a short distance only, we must naturally recognize in the assemblage of the little scales with which this part is furnished, a special organ capable by itself of feeling the action, the first effect of which, as we have said above, is the increase of the entire receptacle. Not being able to attribute this to any material nutrition which the oil can induce, we must agree that it excites the vegetation of the unripe fruit, always then stationary, by making the lymph flow to it.

The other important fact consists in the faculty of some acids (not to say all), some fatty matters, and certain liquid or semiliquid resinous substances, as mineral tar and petroleum, to produce the same effect as the oil in similar conditions; when they come in contact with the scales which surround the mouth of the fig. Such agents as these and others are quite inefficacious on any other part, in consequence of the local alteration of the subjacent tissues which any of them (as, for example, sulphuric, azotic, and hydrochloric acid) may effect, in which case, instead of increase and premature ripening, the fall of the fruit in an unripe state easily ensues.

No one certainly will maintain that this substance brings, by means of the scales, a nutritive moisture to the quite unripe fruit: on the contrary, the increase may rather appear a natural consequence of the drying up of the scales, by means of which the moisture which arrives continually from the branch, stagnates in the body of the organ. This opinion cannot, I think, be accepted, as it does not correspond with the very small quantity of moisture which would have passed to the scales without any agent, and the great quantity which enters in a few days in consequence of its action. The following considerations may be adduced in confirmation of my views. The scales in question vary more or less in number in the fruit of the same tree; in the Tintore there are not less than a hundred in a fruit of the mean magnitude. Their surface on an average measuring two square millimetres, they have together a surface of 200 square millimetres, equal to $\frac{2}{3}$ of a square inch; and there being two faces to each

scale, a hundred of these scales will represent altogether a surface of $\frac{1}{4}$ of a square inch, equal to the fifth part of the entire superficies of the receptacle, which amounts to 3 square inches. This being premised, since the scales, like other organs, have the power of attracting much sap, it would necessarily follow that they would increase in size and would exhale abundantly,—two functions which accompany each other wherever there is growth in contact with the air, but which fail when we anoint the scales, already arrived at their perfect growth, and in which the exhalation ceases entirely, or is very weak, the place which they occupy being for the most part free from the influence of light and air.

As regards the sulphuric acid, this observation must be made,—that, as it has a great affinity for water, it would attract the sap to the body of the fig at the end of the branch. But so many other acids and fatty matters do the same without possessing the faculty of attracting water. Besides, the sulphuric acid, after the manner and under the conditions before stated, by altering the tissue of the scales, kills them, while it excites on the other hand the vegetation of the entire receptacle more strongly than any other substance which has been tried hitherto, promoting the increase and maturation in less time. The exciting-power of this acid on certain vegetables, especially lucern, has been known for many years, whether used alone, diluted with water in the ratio of one to a thousand, or combined with lime. But I wish to give another illustration of its bearing on the present subject. At the end of the year 1845, when treating of caprification, I noted that the pollen of the Wild Fig, kept in water, seldom or never protruded the pollen-tube, and that this took place easily by slightly acidulating the water with azotic acid. In the present year I have confirmed this observation, and obtained in like manner the pollen-tube in a few hours in water scarcely acidulated with sulphuric acid, while from the pollen kept in common water not a single pollen-tube was protruded in the course of three days.

It appearing, on the other hand, that the scales at the mouth of the fig are sensitive to the action of sulphuric acid and the other substances above mentioned, it remains to ascertain what relation this sensibility inherent in the scales bears to similar functions in other plants. But we must first shortly call to mind the origin, formation, and structure of the fruit of the fig, known to science at various times under the name of "sicono," "anfanto," and more generally under that of "receptacle." It springs

up in the axil of the leaf, at the time when it is young and growing, and, as the bud on the branch, corresponds especially with the small portion of cellular tissue which divides at the articulation into two merithals, a superior and inferior, and is continuous with the outermost part of the medullary tissue. The cellular stratum, which is at first green, which afterwards appears dotted, containing starch-grains, is altogether conformable with the tissue which constitutes the dissepiment between the two merithals. But the receptacles appear at first in the form of very minute cellular prominences on the liber and albumen, just opposite to the dissepiment and on its outer part; and then on the apex the margin of a slight depression begins to put forth several scarcely discernible processes, which are destined to form the scales; and the florets shortly afterwards grow in the centre of the depression. At the same time a very delicate vascular tissue is formed at the base, which is united to that of the two merithals. In the course of vegetation, the receptacle increasing becomes concave, and the aperture contracting remains closed by the scales. Subsequently the vascular fibres, which are accompanied by the lacteal cells, enter the scales, and, distributed under the cuticle of the receptacle, are united by means of lateral branchlets to those of the florets.

This being the case, if we consider the scales as the tips of so many leaves whose bases, fused and incorporated into a single mass, constitute the body of the fig, a strong impression made on the scales, which are the extremities of the organic elements of which it is composed, must promote the flow of the sap from the branch to which it is attached.

The pollen serves essentially to form the seminal embryo, and, notwithstanding the destructive effect which it produces on the stigma, on the style, and finally on the collecting hairs, as has been observed in the hemp, promotes in certain plants the flow of moisture, the softening and maturation of the pericarp. The peduncles of *Hovenia dulcis* increase after flowering, become tender, juicy, and sweet. The receptacle of the strawberry, in consequence of fecundation, increases into that juicy tender pulp which we call the fruit. We have many similar examples in the vegetable kingdom. I do not pretend to assimilate the fact of the early ripening of the fig by the operation of the above-mentioned agents to that of fecundation: that has for its object the growth of the embryo, the presence of which, while forming, at-

tracts the moisture to the part with which it is connected, which is the cause of the formation of the Strawberry, of the *Hovenia* just mentioned, and of the maturation of some other pericarps. It may be objected that the pollen, especially its contents, has nothing to do with oils, sulphuric acid, or petroleum. But still the nature of the fovilla in different plants is not clearly known with respect to other secretions; and admitting its great difference as regards the substances mentioned, it is not the less true that the final effect of the pollen on the stigma, and that of the oil on the scales of the fig, with what follows it, present such an analogy as to justify the opinion expressed by me two years ago in the following words:—"I incline to believe that there is a certain relation between the effect of the pollen on the stigma and what is induced by anointing the mouth of the fig. That part coming in contact with the other softens and perishes in a short time, which may conduce, at least in a small degree, to the increase of the subjacent ovary"*.

II. On the Cultivation of some Genera of Terrestrial Orchids.

By MR. THOMAS SHORTT.

MANY of the most beautiful and delicate of Terrestrial Orchids are seldom seen in cultivation. This cannot be from want of interest; for what can be more gorgeous than *Disa grandiflora* and *macrantha*? or more beautiful than *Cypripedium macranthum*, *Thelymitra ixioides*, and *Lissochilus speciosa*? or curious than *Pterostylis nutans*, *Aceras anthropophora*, and *Ophrys apifera*?

The delicate habits of some species make them rather difficult to manage; at the same time they are of sufficiently robust growth and of such beauty as to make them worthy of more general cultivation.

As they require different treatment according to their various habitats, I propose dividing them into European and North-American, African and Australian. As the European and North-American species require similar treatment, I will take them first. These will comprise the genera *Cypripedium*, *Platanthera*, *Gymnadenia*,

* [A translation of Gasparrini's paper on Caprifigation appeared in the former series of this Journal, vol. iii. p. 185. *Pedagnuoli* are the fruit at the base of this year's wood, *cimaruoli* the fruit at the tips, and *foroni* the new spring fruit from last year's wood.—ED.]

Habenaria, *Aceras*, *Serapias*, *Goodyera*, *Pogonia*, *Liparis*, *Calypso*, *Orchis*, and *Ophrys*. *Cypripedium* must take the first rank; *C. macranthum*, *C. pubescens*, and *C. spectabile* are the most showy, and *C. calceolus* particularly interesting as being British. The whole of them, with the exception of *C. calceolus*, delight in a rich fibrous peat. If grown in the open ground, the foot of an east wall is the best situation to make the bed. The ground must be excavated two feet deep, a layer of brickbats or other rough material placed at the bottom to ensure good drainage (as the plants require much water when in a growing state, but not stagnant), over which must be placed 18 inches of fibrous peat. The plants should be set 4 to 6 inches deep and 12 inches apart, as it must be kept in mind that the whole family are very impatient of being removed or divided when once established; and I would advise any one who has these plants doing well to let well alone, as I have seen fine plants destroyed from taking a piece off for a friend. The protection of a cold frame in winter is very beneficial, particularly if filled with dried fern—as the plants, in their native home, are for the most part covered with snow in winter, so as to exclude the frost.

If well advanced they will require water daily during the growing-season; but when at rest they should merely be kept moist. *Cypripedium calceolus* differs from the others of the genus in its dislike to peat or any soil except good strong loam well impregnated with lime, and prefers an eastern or north-eastern aspect, as it is invariably found in its native home in situations facing the east.

I have gathered this plant more than once in one of the northern localities of Castle Eden Dean, or, more correctly, in Shotton Dean, Durham, and have also seen it in a wood in Cleveland, Yorkshire, and have had specimens sent from Lancashire.

I believe it is not generally known that, when the seed of *Cypripedium calceolus* falls from the capsules, it seldom vegetates, if it reaches the ground, but prefers the axils of the leaves of grass or other plants to perform the process of germination, assuming in the first instance the habit of an epiphyte, after which it falls to the ground and becomes a terrestrial plant.

When grown in pots, large pots in proportion to the plants should be used, so that they may not require shifting for several years. The pots should be half-filled with crocks, and the peat full of fibre, if possible.

The genera *Orchis*, *Ophrys*, and many other European and American Orchids are generally of easy cultivation; at the same time, some are very refractory. *Ophrys apifera* and *O. aranifera*, as well as *Orchis maculata superba*, are very curious and of easy cultivation, requiring a strong calcareous soil. The best time to remove them is when the flowers are on the decay, the tubers for the following year being then fully grown. The tubers should be carefully lifted and divested of all soil, and planted in strong loam passed through a fine sieve in a rather dry state, after which they should be deluged with water, by which the soil becomes firm and compact, a condition in which the plants delight.

Orchis bifolia and *foliosa* succeed with the same treatment, substituting peat for loam.

African Species.—Africa is rich in Terrestrial Orchids, prominent among which is *Disa grandiflora* with its crimson flowers of great beauty; *Disa macrantha* has larger flowers, of a pure white, and is perhaps the finest of the genus; *D. secunda* is a small edition of *D. grandiflora*; *D. barbata* has a twiggy habit. *Lissochilus speciosa* is very fine, attaining a height of from 4 to 6 feet, and producing magnificent loose spikes or thyrses of yellow butterfly-flowers. *Eulophia Dregiana*, the flowers of which resemble a little dove hanging by its beak, is white, with chocolate sepals. Some of the *Satyria* also are worthy of notice.

The whole of the African species succeed best in fibrous sandy loam, the pots being well drained and large in proportion to the plants. The *Disæ* are very impatient of heat or a confined atmosphere. A pit with a north-east aspect suits them best for summer, and a cool greenhouse in winter.

In potting *Disæ* great care should be taken not to injure the roots; for a loss of leaves, more or less in proportion to injury, will certainly follow. During the growing-season a liberal supply of water is required, keeping them much drier when dormant. They are, however, seldom completely at rest. They cannot endure the least frost, though a very cool treatment must be followed.

Australian.—Many of the Orchids from this extensive country are beautiful, curious, and interesting. *Thelymitra* takes the first rank, producing bright-blue flowers in spikes from 1 to 2 feet high, and generally grows among dwarf bushes. *Diurides*, with their yellow and brown flowers, luxuriate in open glades in the full sun. The curious *Pterostylis cryptostylis* and *Prasophyllum* and others delight in the shade of Eucalypti and other trees.

The whole of the Australian species succeed in smaller pots than the species previously named. *Diuris* prefers a rather strong loam, *Thelymitra* a sandy fibrous soil, and *Pterostylis* soil off a basaltic formation, if attainable. A brick pit with a south-eastern aspect, free from frost, suits them well. They do not require so much water as many other terrestrial orchids.

There are many other very beautiful genera found in Australia; but, as many have proved almost uncultivable, I have not noticed them. Nothing can be more interesting than a collection of these beautiful plants; they are easy of introduction, and with little attention will well repay the cultivator for the trouble bestowed upon them.

III. Note on one of the Hybrids between the Muscat of Alexandria and the Trouvéren Muscat, which promises a supply of grapes all the year round. By JOHN STANDISH, Royal Nursery Ascot, Berks.

WHEN my "Hints on Hybridizing Fruits" were published in the first volume of the New Series of this Journal, page 135, I had not witnessed the extraordinary fertility of one of the hybrids there mentioned, and which has now received the name of the Royal Ascot. It has proved itself a perpetual bearer, forming bunches on every branch and lateral branch that it throws out, and can be made with the greatest ease to have ripe fruit all the year round. If, for example, a house filled entirely with this variety were started the first week in December, and, when the shoots were of sufficient length, thinned out so as to leave only enough for half a crop, they would break again, or throw out a quantity of laterals, when some more branches might be left, and, so vigorous is the plant, in six weeks again some more. These three partial crops would swell, so as to prolong the fruiting till the end of October, by which time the vines would want pruning in for forcing the next season; and what then remained could be cut, with a piece of the wood, and placed in bottles of water on the French plan. This house would give grapes from the beginning of June until Christmas.

Another house might be started in the middle of July, leaving again only half a crop, and so on as before, which would give grapes from January until the end of July. By adopting this plan, in two houses, grapes could be had all the year round without any difficulty; and should extra grapes be wanted for some

special purpose in any of the spring or winter months, it would merely be necessary to give the proper notice to the gardener before March in one year, to have any quantity of grapes in the winter or spring of the following year, without much trouble and at very little expense, as grapes grown from July until midwinter can be grown with half the expense of those produced from December to June. Young cuttings struck from this vine any time before March can be made to bear a good crop of fruit the following January, February, and March. Last May I planted a house with little plants not a foot high, out of four-inch pots; and they are now, at the beginning of December, bearing a nice crop of beautiful fruit, which will be ripe the second week in January—and these grown amongst pines under very disadvantageous circumstances.

It is curious that this grape, which is large, oval, and the blackest of all grapes, was raised from two white grapes, the female parent, the Muscat of Alexandria, having oval berries, while the male parent, the Trouvéren, has globose berries. It is still more curious that, when grafted on its male parent with globose berries, and on Graham's Muscat Muscadine, which has similar fruit, the berries have in both cases undergone a complete change of form in correspondence with that of the male parent, but without the slightest difference of colour.

This curious effect of the stock on the graft confirms some other reports of a similar nature, one of the most singular being one which has lately been recorded by Dr. Hogg, where the Marie Louise pear, grafted on three different stocks, gave three very different forms of fruit, one of which only could have been referred by the most practised pomologist to the parent plant*. The subject is one of extreme interest, and deserves a set of carefully conducted experiments by some one who has time and patience to follow it out.

IV. Preparing Lilies of the Valley for Forcing.

By MR. W. EARLEY.

As it may not be very generally known that by a very simple mode of procedure the forcing-capabilities of this most deservedly

* [Dr. Hogg has kindly shown us the specimens, which he brought from the Rev. W. Kingsley's.—Ed.]

popular plant may be materially enhanced, no excuse will be necessary in introducing a few remarks upon the subject in this Journal, more especially when it is considered that it is next to impossible to have a too large supply of them in flower, from the earliest months of the year onward until it may be possible to gather them from outdoor beds. As a British plant, it should be essentially within the province of our craft to push the "Lily of the Valley" to its utmost cultural limits, without the aid or intervention of foreign ingenuity, or even more favourable climate. Yet true it is, nevertheless, that the Dutch, or others, are now making a profit by growing patches of these suitable for forcing, and then sending them to this country by many tons' weight annually, in company with bulbs which we are obliged to look to them for. There are two distinct features, in the cultivation of this plant, operating antagonistically to the simple efforts hitherto expended in its culture, namely :—a great dislike of being uprooted and separated into smaller portions, which do not very readily attach themselves to the fresh soil; and, when once they have taken possession of the same, such an extraordinary power of multiplication of all parts that they very quickly become very densely packed together, each thereby neutralizing the efforts of the others to attain a fine crown likely to flower in the ensuing spring, and, even should it flower, operating prejudicially as to its fineness. Hence the want of greater success in forcing plants grown after the ordinary method.

With the above suggestions as a basis to our subsequent operations, a piece of ground should be prepared by making a trench a foot and a half in depth, adding abundance of manure, and working it to the necessary space which may be required, according to the quantity needed. When finished, the soil should be trodden firmly over its whole surface. Forming little bundles of from two to five individuals, and with all the roots possible attached and uninjured, dibble the bundles firmly in rows, some 20 inches apart. Fix them firmly in the soil, putting a thick layer of leaf-mould over all when finished. With proper attention and keeping them free of weeds &c., they will be fit for forcing in three years. Hence it will simply be necessary to plant a small space annually, to ensure after the above date a constant succession of excellent patches. A west aspect is the most suitable.

V. On Various Forms of Canker.

By the Rev. M. J. BERKELEY, M.A., F.R.H.S.

It is scarcely possible to give much attention to the subject of Vegetable Pathology without recognizing the fact that diseases apparently very closely connected with each other may be due to entirely different causes. This is especially true of the various affections which pass under the name of Canker, than which few are more injurious to the cultivator, and which are so frequent in some localities as to make the cultivation of particular varieties a labour, if not entirely hopeless, at least full of vexation and comparative disappointment.

Many forms of this formidable disease were indicated in the series of articles which appeared some years since in the 'Gardeners' Chronicle,' on Vegetable Pathology, but which, from various causes, though many applications have been made with a view to their publication in a separate volume, have never passed beyond the pages of that journal. The subject of Canker is, however, of such importance to the cultivator, that, with the sanction of the highest authority in this country on pomology, I have been induced to reconsider the various forms which it assumes, and to publish the results in this Journal.

Every one on hearing the name will call to mind the ravages which he has witnessed amongst his apple-trees, insomuch that, after a year or two, the most promising young plants either lose whole branches or the trunk exhibits unsightly cavities which at length, by their confluence, become so extensive as to impair materially their fertility and ultimately to cause death. But these are far from being the only cases; and, unless I am greatly mistaken, some affections which at first sight seem of a very different character are referable to the same group. Nor is the disease confined to trees or the harder structures; a very common form occurs on the fruit itself; and such diseases as the Tacon, which is so fatal to the Saffron-growers in France, and has lately done so much mischief amongst the cultivators of the fine varieties of *Gladiolus*, appear to belong justly to the same category.

In some cases, the Canker-patches affect at once the whole circumference of the branch; but far more frequently they are scattered here and there, without one being able to give any reason why one portion of the tree should be affected rather

than another. This, however, is merely what we observe in many forms of disease, both in the animal and vegetable kingdom—and, indeed, in various cases where it is clear that the whole system is affected, but where it breaks out only in isolated spots. Doubtless there is some special organic weakness or predisposition to change in those parts, which makes them more liable to attack, where there are no especial organisms at various distances which are alone affected—as, for example, in cancerous changes in the glands, which, in aggravated cases, are sometimes attacked almost indiscriminately. We see something of the kind occasionally where there is no question of vitality. A piece of paper, for example, as the page of a printed book, which has been kept in a damp room, undergoes a slow process of decomposition somewhat similar in character to that which is called by chemists *eremocausis*; in general, however, the discoloration is not general, but appears in the form of brown spots scattered over the surface. Again, in that very curious form of decay to which wood is subject, in which the medullary rays disappear, and the wood-cells are here and there bleached and contracted so as to form little cavities in the wood, the intermediate tissue remains sound and unaltered. In that form of canker, for example, to return to living organisms, which is so common in the fruit of certain varieties of Apples, the whole fruit is not cankered, but the soft tissue is decomposed here and there, so as to present a speckled appearance; and the same may be said of other varieties of Canker to which the fleshy parts of plants are subject.

In other cases, however, the evil is confined to especial spots, as in the affection called gumming, which is really a form of Canker, the cause of the local disease being sometimes distinctly traceable without any general constitutional tendency to disease,—though undoubtedly this is sometimes the case; and, indeed, forms of the same affection occur where almost every fruit-bearing twig is simultaneously diseased, and where it is very difficult to assign a cause. The disease in these cases is modified by the exudation large quantities of gum, as in Conifers it is by the presence of resin.

In a single rare case which has fallen within my notice, the Canker appeared under the form of a deep broad annular pit surrounding the whole trunk near the base, and penetrating deeply into the wood, and of course inducing death.

In a few cases Canker may be induced by insects; but where

it is possible to trace the affection from its earliest stage, it will sometimes be found that what at first sight might reasonably be supposed to depend on insects has really a different origin, though occasionally they may have aggravated the evil.

On examining the affected tissues, little perceptible difference occurs. In all cases the walls have become more or less flaccid, though seldom broken up, and have assumed the brown tint due to the presence of ulmates. The endochrome has often entirely vanished, or has been deposited on the cell-walls under some altered form. In moister tissues, where the cells are still turgid, the contained liquid abounds in minute brown granules; where ducts or vascular tissues are involved, the cavity is sometimes gorged with brown matter. The surrounding living cells are gradually affected, and a complete or partial change takes place, so that all neighbouring growths assume an altered form; and the lesion is of greater or less magnitude in proportion to the rapidity with which the taint is communicated. The evil may sometimes be arrested for years where pains are taken to remove carefully the affected part and to secure the wound by some application which may protect it from atmospheric influences.

A notice respecting the cause and proper remedy for Canker, by Mr. Rivers, appeared in the 'Gardeners' Chronicle' for Dec. 13, 1856, which seems highly worthy of attention. After stating that certain varieties of apples, as the Ribston, Golden Pippin, Newtown Pippin, Nonesuch, and Old Nonpareil, defy the utmost care of the pruner, he attributes the malady in these cases to deep rooting, and he not only suggests as a remedy biennial removing, but states that this system has answered in practice, and that, where delicate varieties had been accidentally undisturbed, canker prevailed. At the time of replanting, a quantity of charred garden refuse or burnt earth was added to the soil with good effect. Those varieties, however, which are of a less delicate constitution need not be removed.

In the same journal (June 13, 1857) is a notice by myself of a pamphlet on Canker, by Mr. John Pearson, which is deserving of especial attention. His remarks, however, apply more to stone-fruit; and it is well that cultivators should keep them in mind. Delicate plants from warm countries cannot bear the wear and tear of our changeable climate without care. The buds in half-ripened wood are affected by alternations of wet and cold weather; and he has attempted to prove this by causing artificially a stream of water to pass over the buds, and has induced in this way gum or

canker. Something, indeed, of this kind had already been tried by Mr. Knight; but it was certainly most desirable that the experiment should be confirmed, whether Mr. Pearson was acquainted or not with what had been done previously.

There can be little doubt that the main cause of Canker is penetration into an ungenial or badly drained soil, and a frequent lowering of temperature in consequence of the presence of constant wet; but in many cases a naturally weakly constitution must be taken into account, which gives way under rapid alternations of cold and heat. In no case, I believe, is any parasitic fungus concerned, though, where branches have perished from Canker, such fungi as *Tubercularia vulgaris*, *Sphaeria ambiens*, &c. often make their appearance, and are occasionally considered the cause rather than the consequence.

The different forms which Canker assumes do not very readily admit of classification. The most convenient plan will probably be to consider separately those which affect each particular tree or group of trees. I begin, therefore, with those which occur on Apple-trees, of which there are several varieties.

1. One of the most common forms of Canker in Apple-trees is that which is produced by the woolly Aphis. The little insect gains admission generally at the base of a young shoot or bud, and by constant imbibition of the juices and consequent irritation causes an irregular growth, accompanied by a greater or less decay of the tissues, so that in a short time a ragged hollow is produced; and where these hollows are scattered over the whole tree, the fertility is greatly impaired, and death at length ensues. The common Codlin is perhaps more subject to this form of Canker than any other variety. A careful inspection will enable the cultivator frequently to arrest the evil in an early stage. I have found nothing so effectual as the common mixture of grease and tar which is applied to horses' hoofs; if this be rubbed in carefully with the finger, the evil will in general be arrested. Where, however, it is of long standing, it may be more difficult; and even if the insect is destroyed, the diseased tissues may taint those beneath, and the malady will thus continually burrow deeper and deeper.

2. A second form of Canker, to which the Keswick Codlin is peculiarly subject, at first sight appears very similar to this, but on close inspection it will be found to be of a totally different nature. Probably from something wrong about the roots, a quantity either of adventitious buds or roots are produced in little shield-like patches. If buds, they are undeveloped; if roots, the

tips soon die, and the taint is rapidly communicated to the underlying tissues: new wood and bark are formed round the patches, which are in consequence sunk more or less deeply; the sides of the surrounding wood and bark are soon more or less involved in the disease, the hollow becomes ragged and unsightly; whole branches by degrees perish from the disease being carried round them, the trunk itself is filled with unseemly cavities, and the tree at length dies. Much the same process takes place frequently in the common Laurel, less frequently perhaps in the Laburnum; and there can be little doubt that the mischief arises rather from a bad condition of the roots than from any deleterious matter being imbibed. I have no information to show whether this form of Canker admits of remedy by lifting or not.

3. A third form of Canker is extremely common, and shows itself in various ways. Either distinct patches of diseased tissue appear on different parts of the tree, or whole branches perish at once, the cuticle in most instances shelling off from the other portion of the bark. This undoubtedly in many cases arises from decay of the buds. Water collects in drops upon the buds and congeals, the vitality of the buds is lowered, disease takes place, and the tissues decay down to the wood, or penetrates it, and, in consequence, no fresh deposit can be made. I do not say it always arises from a bud, whether developed or adventitious; but I believe this very generally to be the case, and where the shoots are thin and ill ripened the progress is extremely rapid. The same process as before takes place; new growth is formed round the diseased patch, and a hollow gradually made as before. An old, experienced gardener told me that he was careful to prune off every spur which showed any symptom of decay, and never to leave any decayed fruit where the peduncle had not separated from the spur on the tree, as he had observed Canker often to arise in this manner. Where the diseased patches occur on the stem, if they are cut out effectually, and the tissues protected from further decay by some kind of paint, the disease may be arrested; but no time must be lost, and every tainted shoot must be carefully removed. If, however, the disease has arisen from the penetration of the roots into ungenial soil, and not from stress of weather, timely lifting and root-pruning is the obvious remedy.

4. A fourth form of Canker I have observed on the Royal Russet, and it probably occurs on other varieties, though I have not observed it elsewhere. The whole of the tender bark, for several inches of the stem, looks as if it were pitted with the small-

pox; the spots gradually become confluent, extending round the stem, which perishes, sometimes just as the fruit is coming to maturity, exactly after the fashion of what so constantly occurs in Apricots. Up to a certain time there was sufficient living tissue to carry the needful supply of sap; but the demand being at length at its maximum, the fountain-head fails.

5. A fifth form of Canker occurs occasionally, as in the Blenheim Orange, though at present I have not seen it proceed to such a height as to produce serious mischief. Patches on the trunk assume a fibrous appearance; but the disease does not penetrate deeply, and I have found timely removal to be an effectual remedy. How far neglect might lead to mischief in this case I am unable to say.

6. A very curious form of Canker, very different from any of the preceding, occurs in some varieties, as, for instance, in the Court-of-Wick Pippin. The process is in this case a very slow one, and is indicated by a shortening of the branches and an accompanying narrowing of the leaves. Fruit-blossoms for a time are produced, impregnation takes place, and some sorry apples arrive at their full development; after a time, however, merely a few leaves appear, and the whole branch perishes.

7. I mentioned above that what I believe to be a form of Canker occurs in the fruit itself, in some varieties certainly more frequently than in others; but it is not always fully developed while the fruit is on the tree, though doubtless the cause was antecedent to its being gathered. The fruit sometimes appears sound externally; but more frequently there are slight discoloured depressions on the surface; and when the fruit is divided, brown patches are scattered through the cellular tissue, and the fruit is comparatively worthless. I have frequently examined the diseased spots under the microscope, and could never detect any insect; and the whole phenomena appear to me to belong to the same category as ordinary Canker.

[To be continued.]

VI. Note on the Cultivation of the Mangrove Tree at the Gardens of the Royal Botanic Society of London. By WILLIAM SOWERBY, Assistant Secretary.

As this curious tree has seldom been grown in England, a few notes on its cultivation may interest the Members of the Horticultural Society.

The "Mangrove," *Rhizophora mangle*, is common in most

tropical countries; it delights in salt swamps and the low shores of the ocean. Dr. W. Hamilton thus describes its mode of growth: he says, "In the economy of nature the Mangrove performs a most important part, wresting annually fresh portions of the land from the dominion of the ocean, and adding them to the domain of man; this is effected in a twofold manner—first by the progressive advance of the roots, and secondly by the *aërial* germination of the seeds, which do not quit their lofty cradle till they have assumed the form of actual trees, and drop into the water with their roots ready prepared to take possession of the mud in advance of the parent stems and repel to a further and perpetually increasing distance the invasion of the water. The progression by means of the roots is effected by fresh roots which issue from the trunk at some distance above the surface of the water, and, arching downwards, penetrate the mud and become in time independent trees; thus a complicated labyrinth of vegetation is at length formed, serving to arrest the particles of soil washed down from the interior of the country and raise the level of the ground; the shallow water is thus converted into a salt-marsh, and the salt-marsh progressively dry land. These roots afford attachment to myriads of small but delicious *oysters*, which are left bare during the efflux of the tide, giving rise to the popular fable of *oysters growing on trees*."

After several unsuccessful attempts, we received, in June 1867, many young plants of the Mangrove in very good condition; the very healthy state in which they arrived at the Gardens is due to the care given to them by the officers of the Royal Mail Steam Navigation Company, who brought home the case I had specially prepared and sent out to the West Indies. Of the young plants, which are from 1 to 2 feet high, some have been grown in pots entirely submerged in *sea* water, others are only occasionally watered; but all are kept in a moist warm stove, and are at the present time, August 1868, in good health; they root very freely, and the roots appear not to be injured by the decomposing soil, which occasionally becomes putrid. The plants have not yet thrown out any *aërial* roots; the growth of the stems is intermittent, giving them the appearance of having been grafted.

VII. *Interim Report to the Council of the Royal Horticultural Society by the Subcommittee appointed to inquire into the adulteration of Seeds.*

1. IN accordance with your instructions, your Committee have taken steps to ascertain whether there is any just foundation for the representations which have been made to the Council regarding the unsatisfactory state of the seed-trade and the bad quality of much of the seed sold to the public.

2. It was represented to the Council that, as the business of seedsmen is at present conducted, the purchaser of seeds frequently receives neither the kind nor the quality of seeds he pays for, and that against this he has no remedy except a doubtful and expensive lawsuit after the mischief has been done.

3. It was also urged that, unlike most other kinds of adulteration or deception in the quality of goods, the injury done in the case of seeds does not terminate with the use of the article purchased, but entails, in addition, the loss of the rent of the ground on which the seed may be sown, and of the labour expended upon it in preparing the soil and tending the crop—not to speak of the disappointment of the reasonable expectations of the cultivator.

4. Having no means of compelling parties to give evidence, your Committee's investigation into the alleged adulteration, mixing, or deterioration of seeds has necessarily been confined to making inquiries of those who have the means of knowledge, and on whose statements they could rely.

5. From information so acquired, they believe that the public suffers more or less from the neglect and malpractices of dealers in seeds in at least the following ways:—

(1.) Generally by seeds being kept too long and being sold after they have lost their vitality.

This is the most injurious of all the causes of depreciation; for it applies equally to the honest and dishonest trader. In adulteration, the evil must be done with intent to defraud. Here there may be no intention to defraud; but mere neglect or want of judgment may be as injurious to the purchaser as if there were.

(2.) By the addition of bad seed to good, and mixing old and new.

(3.) By the addition of seed whose vitality has been killed.

This is done in the case of varieties of peculiar excellence, when the supply is insufficient to meet the demand. Killed seed of a cheap kind, similar in appearance to that of a dear kind, is added to increase the quantity without affecting the quality. In this kind of adulteration the purchaser is only deceived in the quantity.

What comes up at all, comes true, and the character of the dealer for supplying a true article is maintained.

(4.) By manipulating and doctoring the seed so as to make bad seed look like good, as by dying bad clover-seed, sulphur-smoking bad grass-seed, oil-dressing bad turnip-seed, &c. &c.

6. Your Committee have been unable to ascertain to what extent these different practices are carried on; but they have reason to think it must be considerable. One of their informants was able, from personal knowledge, to instance one individual whose principal business consisted in destroying the vitality of cheap seeds for the purpose of mixing with sound seed of greater value; and they have reason to believe that this is by no means a solitary case. They are told also that large numbers of people obtain a livelihood by the manufacture of bad into apparently good clover-seed.

7. Your Committee next endeavoured to ascertain how far the various causes, above-mentioned, actually affect the productiveness of seeds sold in the market. They have not at present made any tests with the view of determining how far seeds sold as of special quality or kind come true. Their experiments have, in the first instance, been directed solely to the vitality of seeds; and to that alone the present Report applies. In a future Report they may deal with the quality of the kinds of seeds sold, as well as some other collateral points.

8. In entering on the inquiry as to vitality, your Committee attempted to obtain a test for guessing at the age of seed by the percentage which comes up; but this they found impossible, so much depending on the original quality, and the care with which the seed has been afterwards stored. They made, however, some trials of turnip-seed with this intent; and it may not be without interest to mention that, in them, they found the percentage which came up from home-grown good seed one year old to be 80, three years old 43, seven years old 32, and the older the seed the lower the rate of germination.

9. It would have been beyond the means at the disposal of your Committee to test even a small sample of the goods of all the seedsmen and nurserymen in London; but by going only to the wholesale dealers, from whom the retail dealers of course chiefly obtain their supplies, they thought they could arrive at a fair estimate of the general character of the seeds sold throughout the country. It appears from Dr. Hogg's 'Horticultural Directory' that there are twenty wholesale dealers in London. From each of these (with

the exception of two, who were accidentally omitted) the Committee purchased samples of five of our commonest garden-vegetables (cauliflower, broccoli, carrots, and white and yellow turnips)—care being taken to prevent the purpose for which they were wanted being known. The samples were numbered, and the names of the dealers from whom they were got were kept secret; 100 seeds of each package were tested by the Society's officers at Chiswick, and a like sample separately by one of the Members of the Committee, and the number of seeds which came up were counted. In addition to this test, in a number of instances, especially where, before sowing, the appearance of the seeds was not good, they were mechanically tested by crushing and microscopical examination; and that test was found to correspond with the result of the trial by sowing. The test by floating was also tried, but found of no value with the kinds of seeds specified.

10. The results of sowing, as shown by the average of both trials (which, it is right to say, in general corresponded very closely) were as follows:—

Out of the eighteen packages of 100 cauliflower-seeds, the following numbers respectively came up, viz. 86, 70, 66, 60, 56, 54, 54, 52, 51, 51, 50, 44, 44, 44, 43, 39, 36, 24.

Out of the eighteen packages of 100 broccoli-seeds, the following numbers respectively came up, viz. 86, 83, 70, 68, 65, 62, 60, 59, 56, 55, 50, 46, 42, 42, 39, 35.

Out of the eighteen packages of 100 carrot-seeds, the following were the numbers which came up, viz. 61, 56, 54, 48, 47, 45, 44, 43, 41, 38, 38, 37, 37, 35, 33, 30, 19, 14.

Out of the eighteen packages of 100 white-turnip-seeds, the following numbers respectively came up, viz. 98, 95, 93, 87, 87, 83, 82, 71, 70, 68, 68, 66, 65, 64, 62, 60, 58, 57.

Out of the eighteen packages of 100 yellow-turnip-seeds, the following numbers respectively came up, viz. 95, 84, 79, 79, 78, 77, 72, 72, 67, 66, 65, 64, 62, 58, 55, 55, 44, 28.

11. It should be added that the quality of different kinds of seeds obtained from the same tradesman was not always uniform, all good or all bad; the cauliflower would sometimes be inferior and the turnip superior, and so on; but, on the whole, a good position in one kind was generally accompanied by a good position in all. It is also to be observed that the general percentage is less on some seeds than others—a difference probably due to the greater care required in harvesting them, and, in the case of carrots, to the difficulty in separating the good seed from the bad.

12. In seeking for a remedy for the evil, your Committee recognized the existence of two distinct elements in it, each requiring different treatment:—1, the actual adulteration of seeds; and, 2, the mere keeping them too long and selling them when too old.

13. Actual adulteration is entitled to no mercy. It is a deliberate and intentional fraud, in the suppression of which the trade is as much interested as the general public, and ought to be suppressed by the strong hand of the law in the same way as any other fraud.

14. It is different with the selling of old seed. The seeds produced in different years, like different vintages, vary in their quality and in their power of retaining their vitality. It thus sometimes happens that two-years-old seed is better than one-year-old. There is thus a special difficulty in dealing with it; but it is clear that the public are entitled to get what they pay for; and if it is necessary, to secure this, that the dealer should test the quality of his seeds each year, it is his duty to do so.

15. It seems a right and proper thing that Government should bestow some pains in protecting the very large numbers of ignorant and uneducated people who have to purchase seeds. In Prussia, *Sachverständigen*, or, as we should call them, experts, are appointed by Government, whose duty it is, for a certain fee, to test the quality of the seeds of such merchants as apply to them, and to publish the results; and in some districts (Saxony and Würtemberg, for example) there are officials, paid by the Government or district, whose business it is to look after the culture of fruit-trees and to give gratuitous advice to all who apply to them for it.

16. But, independently of the action of Government, your Committee are disposed to think that the Council of the Royal Horticultural Society might itself do much to encourage the sale of good seeds, if not to prevent the sale of bad. How it can most effectually exert its influence for this purpose, is a question on which the Council might probably obtain useful suggestions from the respectable members of the seed-trade; and your Committee recommend that a number of them be invited to meet the Council and give their views as to the best steps to be taken to remedy the evil.

VIII. *Second Interim Report by the Subcommittee on the Adulteration of Seeds.* ("VITALITY"—continued.)

SINCE presenting their last Report your Committee have obtained additional information, which they think will be sufficient to enable the Council to take some action in the matter.

The circulation and publication of their former Report brought

forward many to speak to matters within their cognizance, and led to a certain amount of discussion in the public prints, which has not been without its use.

So far as they have heard, no exception has been taken by any one to the statements in their former Report. They understand that they are admitted to be a fair and moderate statement of facts, so far as they go. Some of the details have been explained or apologized for; and the burden and odium of others have been shifted from England to the Continent; but the fact of their existence has not been disputed.

The minor details of manipulation your Committee think of little consequence. The mixing of old seed or killed seed with new to increase the apparent quantity is the chief evil, and the practice which your Committee have found it most difficult to deal with. At the first blush it seems a monstrous absurdity, not to say iniquity, that the grower should be at pains to clean his seed, and bring it to a high average of good seed, only to have the dealer put himself to equal pains to undo his work and reduce it again; but an explanation of the peculiarities of the business has shown how naturally and easily the practice has imperceptibly glided on from innocent and natural precautions to its present questionable state.

The crop of many of the seeds which form the staple of the seedsman's business is always uncertain and precarious in this country. A single night's frost at a critical period may destroy the whole of the crops of turnip-, mangold-, cauliflower-, or cabbage-seed exposed to it. The seedsman thus can never calculate on the supply of the coming year. It may be a failure; and he most properly provides against this by laying in a large stock when the crop is abundant and good. But what is he to do with the large stock so laid up in the case of a sequence of two or three good years? He uses it up by mixing the product of the different years together. By and by a bad year comes, but, by the seedsman's precautions and forethought, a sufficient oversupply from previous years remains in stock, and the country is not unprovided. From such occasional intermixture there is a natural and easy descent to a constant lowering of the average. Troublesome questions are put if the seed is found better or worse one year than another. So it comes to be thought that it would be more easy for the seedsman, and less troublesome for the customer, if it were kept always at about the same average, and the price correspondingly lowered; and so the system of regular manipulation and tampering with the quality is introduced.

The next stage, of introducing killed seed instead of old dead seed, is still more easy. It is obviously much more to the customer's advantage, *if the average is to be lowered*, that it should be done by the intermixture of clean fresh-killed seed, rather than of old musty seed, full of the spores of fungi and the eggs of insects. So regarded, the introduction of killed seed is a boon to the buyer instead of an injury. There is, indeed, another point of view from which to look at it. The old dead seed betrays its presence; the killed seed does not, and so the purchaser is deprived of that means of testing the quality of the article he purchases.

Everything is thus thrown upon the honesty of the dealer. He fixes the price, he regulates the quality; and the purchaser is kept in the dark, and has no check upon either. This is a temptation beyond what the average frailty of human nature ought in fairness to be exposed.

It is not to be supposed that the existing system could have reached its present magnitude through the separate and independent action of individuals; it is the combined action of the trade which has done it. At what time it commenced your Committee have not learned; but it is no modern device. Most of the present members of the seed-trade have succeeded to it as to a fatal heritage, and they have found themselves constrained to conform to the traditional custom of the trade, or run the risk of sacrificing important and well-established businesses to the ruin of themselves and their families.

The combined action of the trade, which has consolidated the system, has been exerted through a trade's club, or association, something in the nature of a trade's union, which, as in other businesses, the London wholesale seedsmen have established among themselves. One of the chief functions of the association is, as your Committee are informed, the regulation of prices and the determination, by mutual consultation and advice, what kinds of seeds should have their average lowered, and to what extent it should be done.

Supported by the countenance of their fellows, and animated by a belief that by their foresight and superintendence they are regulating the supply and demand of the kingdom, and preserving the country from the dire consequences of an occasional famine in some of the most important articles of food, it is not surprising that the seedsmen should have lent themselves to a practice which, in addition to these good qualities, had the recommendation of being at the same time so easily adapted to their own advantage.

Accordingly the practice has taken root so firmly, and ramified in so many directions, that it now penetrates every branch of the business. Of its extent no stronger evidence can be given than the regular quotation in certain of the seed-trade lists of the prices of "nett seed," and "trio" or "000,"—"nett-seed" meaning good seed which has not been adulterated or mixed, "trio" or "000" meaning seed whose vitality has been killed for the purpose of mixing with good seed.

It must not be supposed, however, that there are no exceptions to the universality of the practice; the results of your Committee's inquiries, confirmed, as they have been, by the trials recorded in last Report, enable them to speak to the contrary. From these, were it their cue to do so, they could name the few houses which proceed on a different system, and which are struggling single-handed against the overwhelming preponderance of those who do not. But to do so would be by implication to reflect on others; and as the object of the Council in this inquiry is entirely of an impersonal nature (to redress a public grievance, and not to attack individuals), they feel bound to refrain from mentioning names on either side, even when the mention would be laudatory.

Of the complication and difficulty of doing away with the system an idea may be formed from some of the following facts. Instead of purchasing their seeds from growers in the market, wholesale seedsmen find it necessary to enter into a sort of *quasi* partnership, or joint adventure, with the growers. They supply them with the seeds they want grown, and receive the product from them after harvest at certain previously fixed, or proportionally arranged prices. In no other way (of growing by a third party) could they make sure that the seeds they purchase were of the kind they wanted,—the *seeds* of many different species, and especially of varieties, being undistinguishable. Unless they knew that the produce of any particular field was to be their own, they would neither have the right nor the interest to examine it while growing, to make sure of its kind. As may be supposed, the bargains with these growers vary infinitely: sometimes the seedsman is the owner of the soil, and the grower his tenant; and leases or bargains for growing seeds, extending over many years, have been entered into on the faith of the continuance of the present system of conducting the seed business.

Again, one apology for the present system is, that under it the seedsman keeps the price much more equable from year to year than it would otherwise be. He charges always more nearly the

same price, trusting to the average of years and prices equalizing things in the course of a number of years. Your Committee do not think that this uniformity of price is any advantage to the purchasers, but a great disadvantage, if obtained, as it is, at the cost of variation in the quality of the seeds. But the fact being that, whether an advantage or not, the seedsmen have been to a certain extent acting upon it, it is plain that injury might be inflicted upon them if the system were suddenly put a stop to. If, for example, a seedsman is now in the midst of a course of years, of which the first half, which is past, has been bad, a sudden change would deprive him of the chance of restoring things during the remainder of his cycle of years, which, as the first half had been disadvantageous, he might reasonably expect to be good.

It is plain, also, that arrangements made in dependence on the continuance of the present system cannot stop merely at the actual bargains between the dealer and grower; a multitude of engagements, sales, and purchases in advance, more or less arising out of the same state of things, are all in dependence. Even the discharge of the servants employed in the mere mechanical operations of mixing the seeds would of itself occasion much distress, if any change leading to it were carried out suddenly and without ample premonition.

Too much caution, therefore, cannot be used in dealing with a matter affecting so many and such important interests, and where the consequences of any error would be so grave.

At the same time matters cannot be allowed to remain as they are; and your Committee's first idea was, that the seedsmen themselves should undertake their own deliverance. They believe that these gentlemen are themselves thoroughly in earnest in their desire to get rid of the present system; nay, more, they believe that the more respectable members of the trade take no advantage from it, that their profits are not greater than those of other similar branches of industry, and that pecuniarily they would be gainers by the abolition of the system, and the substitution of a higher price for a better quality of seeds. But it is to be feared that they are so hedged in by the engagements and bargains that they have made, that it is very doubtful if they would be able to shake themselves free from its trammels by any efforts of their own. And even if they could, and, by a unanimous resolution of the trade, were to renounce all mixing of seeds thenceforward, the public would not benefit; on the contrary, they would be losers; for, instead of having the system conducted, as at

present, by men of respectability, who, at least, aimed at providing a constant supply, the public would find their places supplied by a lower and more unscrupulous class, who would have no object but fleecing the public as rapidly and filling their own pockets as full as they could. Any effort for good must, therefore, not be limited to the voluntary abstinence of individuals, but must be compulsory and of universal application.

It may be said, If, notwithstanding the unfavourable appearances arising from their erroneous system, the seedsmen do really conduct their business so fairly and honestly and with such attention to the welfare of the public, why should any change be made at all? why not allow matters to remain as they are? If all did so, and all would continue to do so, and no further lowering of the averages would be practised by the retail seedsmen and small dealers, the public might be content to allow matters to remain as they are; but it is patent and notorious to all that the reverse of all this is the case. Not even all the wholesale seedsmen are content with the lowness of average fixed by their own association (see the results of the trials in last report); and the average of the stock of the small country dealers who have been supplied with seed filtered through two or three retail hands must be correspondingly bad. But, more than this, your Committee learn from a reliable source that some of the growers themselves have begun to lower the average before it leaves their hands. It can scarcely be denied that this is a fraud suggested by the example of the seedsmen themselves. The practices they have taught them they execute; and it shall go hard but they will better the instruction. The half-educated husbandman will be slow to appreciate the difference between an admixture of lifeless seed by themselves and one by their employer, or to believe that what is fraud on their part, is only estimable precaution on that of the others. Nor, until the seedsman distinctly warns his customer that he is not selling "nett seed," will the public generally admit the distinction. No doubt the *grower* undertakes to deliver, and receives the agreed-on price for, "nett seed," whereas the *seedsman* only charges his customers for seed of a lower average a price corresponding to its quality. If a purchaser demanded "nett seed," he would have to pay more for it. But the public know nothing of such distinctions. They have never heard of "nett seed" or "trio;" and in purchasing seed they naturally suppose that they are getting the best the dealer can give them. There is no objec-

tion to the dealer, if he chooses, having half-a-dozen different averages at half-a-dozen different prices, as a grocer sells half-a-dozen different kinds of tea, or a wine-merchant of vintages ; but they should be stated to be so. This may seem a digression, but it is not irrelevant ; for the equivocal system which the trade have so long practised will render an extra openness for a long time necessary to recover the confidence of the public.

Your Committee are of opinion, therefore, that something more than good resolutions on the part of the trade are absolutely essential ; what that should be is the difficulty. Various suggestions have been made to your Committee ; but they have found no one plan adequate to meet the evil. An application to the Board of Trade for the appointment of a Government inspector has been suggested by some ; either trials of seed at the request of dealers themselves, or unknown to them, and the publication of the results have been recommended by others ; and the passing of an Act of Parliament to render it penal to adulterate or to mix killed seeds with good seeds, is the specific of a considerable number of men whose opinion is entitled to respect ; but your Committee have been unable to see that any one of these steps would of itself be sufficient to meet the end. Probably a combination, or rather a selection, of them might, especially if supported by genuine and sincere exertions on the part of the trade itself. For actual *adulteration* (as of clover-seed) an Act seems indispensable ; no one will object to this : but your Committee think it should also extend to the use of killed seed for mixing. No Act, indeed, that could be expected to pass would directly reach the use of old naturally dead seed for this purpose, but it might indirectly ; for if the use of *killed* were prevented, the actual supply of old dead seed would not be sufficient to do much harm ; and even if it were used, its appearance would betray its presence, and put the purchaser on his guard.

There are other points which can only be reached by introducing more generally a system of actual trials previous to purchases ; and to this your Committee think every effort should be directed. In some districts it appears that farmers and growers are now getting into the way of taking their half-dried grass-seed to the kiln to be dried. Whether it gets a roasting or a gentle heating merely sufficient for the purpose is, as business is now conducted, a matter of no great importance either to the kiln-owner or his customer. It may be sold as good seed, or, if found out, will, at least, do for "trio." But if "trio" were abolished, and trials were

general, the farmer would soon find his roasted seed left on his hands ; if this happened once or twice, the process would either be made safe or abandoned.

It is not easy to understand how any one who has to use considerable quantities of seed should ever dispense with this precaution. It may be that the trouble of testing is supposed to be greater than it really is, or that experience has shown the experiment to be useless, as, from the general adoption of the same average, no better quality is to be had in one shop than another. If the latter be the cause of the neglect of this self-evident precaution, it must soon cease to be a reason ; for, as soon as the public know that the quality of the seed sold has hitherto been matter of regulation, they will evince a preference for those tradesmen who do not adopt that practice ; and, of course, the demand for such will produce its natural consequence, a supply. It will then become essential for the public to know whether those who profess to have abandoned the old system have really done so or not ; and the only effectual way of ascertaining this is to test their seeds. It can scarcely be doubted that if the public were once alive to the importance of this, and if, at the same time, some simple and easy plan of testing the vitality of seeds were made generally known, testing would become general, and a most salutary change in the management of the seed business be effected.

Your Committee have had under their consideration the various modes of testing seeds which are known to them ; and that which they feel inclined to recommend as on the whole the easiest, cleanliest, least troublesome, and most likely to be acceptable to the general public is the placing of the seeds between folds of moist flannel and keeping them in the temperature of a sitting-room or kitchen for a few days. This, of course, is not equal to nature's own test, actual growth in the earth. It may not answer for all seeds ; but it answers perfectly for most kinds ; and any seed that gives a good return under it may be depended on as certain not to give a worse result when actually sown. An idea of its efficiency may be gathered from a trial of it made by one of your Committee upon 100 seeds of one of the sorts whose average of good seed had in previous trials been found to be 75. The simple method recommended gave 25 seeds germinating on the third day, 23 on the fourth, 16 on the fifth, 9 on the sixth, and 3 on the seventh—total 76. But whatever plan the Council think most suitable for general use, your Committee recommend that that plan should be made as widely known and its practice be as strongly inculcated as possible.

MAY.							JUNE.						
Day of month.	Maximum.			Minimum.			Day of Month.	Maximum.			Minimum.		
	Shade. Open air.	South Wall.	Conser- vatory.	Open air.	South Wall.	Conser- vatory.		Shade. Open air.	South Wall.	Conser- vatory.	Open air.	South Wall.	Conser- vatory.
1.	44	63	58	34	38	49	1.	74	88	83	24	51	58
2.	52	61	71	32	38	51	2.	80	95	87	40	55	61
3.	52	67	75	26	39	48	3.	85	89	85	48	57	64
4.	58	79	85	25	33	49	4.	76	89	84	44	54	64
5.	60	79	83	39	42	56	5.	68	73	84	47	52	56
6.	62	78	79	43	46	57	6.	70	74	81	45	54	57
7.	68	87	88	32	42	54	7.	75	79	89	42	55	58
8.	66	83	83	44	48	57	8.	78	91	89	40	51	58
9.	70	82	88	40	44	54	9.	84	101	89	50	51	58
10.	70	71	78	44	44	54	10.	83	100	96	43	51	56
11.	63	71	86	39	43	57	11.	74	86	84	47	55	58
12.	59	71	79	33	38	49	12.	66	86	70	44	50	55
13.	53	66	69	32	38	49	13.	62	66	74	40	48	57
14.	57	67	73	26	35	46	14.	72	82	83	41	54	56
15.	55	71	75	30	38	49	15.	72	83	74	42	48	59
16.	58	73	78	28	36	48	16.	70	82	82	37	48	55
17.	61	84	86	28	39	48	17.	66	75	80	39	46	53
18.	71	91	85	32	42	55	18.	61	75	68½	47	46	59
19.	71	91	85	32	42	49	19.	67	77	80	34	43	53
20.	67	85	84	42	47	51	20.	72	79	81	49	55	62
21.	62	80	81	36	43	58	21.	82	93	86	55	55	64
22.	63	79	79	30	41	46	22.	78	93	85	43	51	57
23.	71	73	82	35	43	48	23.	81	97	86	46	56	57
24.	60	68	69	37	42	50	24.	76	89	85	42	51	55
25.	62	76	80	40	42	53	25.	76	91	82	50	51	60
26.	73	81	80	42	48	55	26.	82	97	85	52	59	61
27.	75	81	84	34	44	53	27.	86	104	88	55	62	61
28.	70	91	86	32	43	51	28.	87	106	90	54	61	63
29.	73	91	83	29	40	47	29.	80	99	83	50	56	66
30.	70	92	75	43	40	55	30.	85	98	88	52	50	61
31.	69	76	76	52	51	58							
Average	63.38	77.67	79.45	35.19	41.54	51.74	Average	75.63	87.90	83.36	44.67	52.53	58.73

Six Months' Observation of Temperature at Chiswick according to Mr. Hadwen's directions.

JULY.							AUGUST.						
Day of Month.	Maximum.			Minimum.			Day of Month.	Maximum.			Minimum.		
	Shade. Open air.	South Wall.	Conserva- tory.	Open air.	South Wall.	Conserva- tory.		Shade. Open air.	South Wall.	Conserva- tory.	Open air.	South Wall.	Conserva- tory.
1.	72	83	83	45	50	55	1.	75	92	85	53	54	62
2.	70	83	80	45	50	55	2.	74	84	82	49	45	54
3.	66	74	77	46	51	57	3.	72	78	81	45	51	57
4.	69	77	74	47	51	57	4.	71	82	85	45	51	58
5.	70	81	81	43	50	58	5.	71	88	84	40	50	58
6.	73	87	83	40	49	57	6.	66	88	71	51	50	56
7.	71	87	80	41	49	59	7.	70	78	83	45	50	57
8.	68	87	72	55	49	62	8.	65	76	79	41	56	57
9.	79	88	87	54	59	65	9.	72	82	81	40	49	58
10.	85	98	86	50	59	62	10.	70	89	78	41	48	54
11.	82	99	85	48	56	61	11.	73	91	77	50	53	59
12.	89	104	86	55	62	65	12.	68	76	72	53	56	62
13.	84	103	88	52	61	64	13.	71	87	76	52	56	60
14.	86	101	87	51	60	63	14.	68	78	74	45	51	44
15.	82	94	85	52	60	63	15.	65	70	72	47	53	58
16.	78	95	82	52	60	63	16.	69	71	71	45	49	55
17.	74	87	77	41	50	55	17.	67	76	72	38	46	53
18.	76	95	85	42	52	57	18.	75	95	81	36	44	52
19.	75	93	80	37	47	52	19.	77	97	81	52	57	60
20.	73	91	76	40	50	54	20.	76	98	78	54	57	61
21.	78	101	83	46	55	59	21.	74	94	77	50	52	58
22.	75	98	86	39	54	53	22.	74	91	75	45	52	47
23.	71	97	79	45	56	58	23.	76	102	80	55	58	58
24.	67	79	75	50	55	57	24.	71	102	73	48	54	57
25.	63	82	77	40	49	54	25.	73	92	77	49	54	57
26.	76	89	82	51	56	59	26.	79	100	82	56	61	57
27.	67	76	73	47	54	58	27.	76	97	82	49	55	57
28.	74	91	79	55	54	53	28.	70	97	73	47	52	55
29.	71	81	82	44	49	58	29.	58	97	64	50	53	59
30.	70	82	79	39	46	52	30.	69	89	77	40	47	53
31.	65	92	72	47	54	58	31.	77	98	82	44	52	57
Average	74:16	89:51	80:67	46:42	53:45	58:16	Average	71:29	88:16	77:58	46:94	52:12	56:61

SEPTEMBER.							OCTOBER.						
1.	70	91	77	49	55	59	1.	61	66	66	50	55	58
2.	67	90	75	40	54	56	2.	70	97	77	51	56	58
3.	65	83	75	48	55	57	3.	71	92	79	52	57	60
4.	67	69	71	55	57	60	4.	62	92	65	50	55	59
5.	68	76	75	72	55	59	5.	55	63	63	52	54	57
6.	68	82	73	54	56	60	6.	61	64	64	49	54	59
7.	65	81	73	63	54	61	7.	68	79	69	44	50	54
8.	68	70	73	55	58	64	8.	66	88	72	45	52	55
9.	68	63	75	53	56	59	9.	59	74	65	45	52	55
10.	69	86	76	50	53	56	10.	65	78	67	39	56	50
11.	63	68	73	46	50	54	11.	59	78	60	34	43	51
12.	60	71	67	47	51	55	12.	49	70	63	29	38	45
13.	66	81	70	50	53	58	13.	62	68	66	40	43	53
14.	65	79	71	42	47	53	14.	56	74	66	27	34	43
15.	65	86	76	43	47	52	15.	58	80	69	27	34	43
16.	63	75	68	43	47	52	16.	53	80	62	26	33	41
17.	65	84	71	30	39	44	17.	57	82	68	41	46	52
18.	65	83	70	51	55	55	18.	55	57	62	46	49	55
19.	67	81	72	44	48	52	19.	60	75	70	47	53	60
20.	60	67	65	42	42	57	20.	62	65	65	45	50	57
21.	62	79	70	43	48	53	21.	63	66	67	46	50	55
22.	55	79	70	39	45	51	22.	59	67	65	29	36	45
23.	61	70	65	37	44	51	23.	60	70	66	39	45	53
24.	61	75	67	32	39	44	24.	61	73	66	42	46	54
25.	64	91	74	45	53	51	25.	49	50	56	40	44	51
26.	64	66	74	47	51	51	26.	55	80	65	29	36	41
27.	68	86	71	43	51	43	27.	54	72	60	39	49	42
28.	71	89	76	48	54	56	28.	56	79	62	24	32	41
29.	70	90	75	51	55	64	29.	52	77	62	35	47	41
30.	66	80	69	51	55	57	30.	56	70	57	29	46	44
Average	65.02	79.03	71.90	46.43	51.23	54.80	Average	59.00	74.32	65.42	39.42	46.22	50.89

- X. Observations by Mr. THOMPSON on the Temperature in the Large Conservatory at Chiswick, comparatively with the external Air in shade and against South-aspect wall, as suggested by GAYLARD HADWEN, Esq., F.R.H.S. (Journ. Hort. Soc. n. s. vol. i. p. 193).

THE large conservatory at Chiswick having been converted into a vinery, and having a large space and surface of glass exposed to the light, the crop of grapes was thought worthy of particular observation, in accordance with Mr. Hadwen's suggestions, as regards the circumstances of temperature under which they were produced. The bunches and berries were large and well coloured, although brought forward chiefly by the sun's rays, with but very little aid from artificial heat.

May.—In this month the average maximum temperature of the external air in the shade was 63°, and the minimum 35°. Conservatory maximum 79°, minimum 51°. Against the south wall maximum 77°, minimum 41°. It thus appears that the temperature of the south wall was 14° higher than the open air, and 2° lower than the conservatory. In the latter fire-heat was supplied at night, and the weather being cold, a little occasionally in the day throughout the month. By the 7th the vines were showing fruit, mostly two bunches on each shoot, and the shoots were 1½ to 2 feet long, about the 11th the shoots were stopped, generally at one joint beyond the fruit, others at two joints, according as there was space for the extension of the shoots. By the end of the month the vines were mostly in flower on the south side of the house; those on the north side were about two days later.

June.—The maximum temperature of the external air in the shade was 75°, minimum 44°. Conservatory maximum 83°, minimum 58°. The south wall maximum 87°, minimum 52°, so that the south wall maximum was 4° higher than that of the conservatory, whilst the minimum of the latter was 6° higher than the south wall. Very little fire-heat was supplied to the conservatory, except occasionally at night. By the 4th the fruit was mostly set, and the vines were stopped a second time, and by the 8th the vines were out of flower, the berries were being thinned, and many bunches were thinned off at the same time.

July.—The mean maximum of external air in shade was 74°, minimum 46°. Conservatory maximum 80°, minimum 58°. South wall maximum 89°, minimum 53. It appears that the maximum

of the south wall averaged 9° above that of the conservatory, and the minimum 5° lower than that of the latter. From the 1st to the 7th a little fire-heat was supplied at night, as the nights were rather cold. On the 1st the outside borders were mulched with manure, the previous mulching being removed. 8th to 19th the borders and paths were syringed every morning, so as to maintain a rather moist temperature, the berries swelling well. 21st, finished mulching borders inside with rotten manure, giving a plentiful supply of water to wash through the manure. 28th, Muscades and Muscat Noir de Jura showing colour. 30th, slight appearance of mildew; vines, foliage, fruit and all smothered with flour of sulphur.

August.—The mean maximum temperature in the shade, open air, 71° , minimum 46° . Conservatory maximum 77° , minimum 56° . South wall 88° , minimum 52° , the south wall maximum being more than 10° higher than conservatory. There was no fire-heat employed during this month.

September.—Mean maximum temperature in open air 65° , minimum 46° . Conservatory maximum 71° , minimum 54° . South-wall maximum 79° , minimum 51° . The south wall was 8° warmer than the conservatory. Fires were used generally throughout the month. The nights were frequently very cold for the period of the year, and the days were unusually sunless. Towards the middle of the month Hamburgs were cut in quantities, an abundant crop, all well coloured and as black as sloes, a consequence of not meddling much with the foliage after the shoots were once stopped in the early part of the season—after that, merely thinning off laterals and stopping shoots that pushed after the first or principal stopping. Although it was necessary to use fire-heat against the cold at night, it was also necessary to leave air day and night; for otherwise the berries would have become damp and mouldy, owing to the moist unfavourable state of the weather. By air and fire-heat the crop was kept pretty sound, and the foliage was very healthy.

October.—The maximum temperature in shade in open air was 59° , minimum 39° . Conservatory maximum 65° , minimum 50° . South-wall max. 74° , min. 46° ; so that against the south wall the temperature was 9° higher than that of the conservatory. Fire-heat was employed at night throughout the month, and occasionally on cold days as well. Notwithstanding cold, wet, sunless weather, the vines produced a good crop, the berries acquired a good size

and a fine colour; the flavour of the Hamburgh kinds was very good; even the Muscats towards the top of the house were very fair; but the Hamburghs, especially the Frankenthal variety, are the kinds which, unquestionably, ought to be selected for a temperature such as these figures indicate. The house was kept as dry as possible, no water being supplied during the month. It was a very bad season also for keeping grapes; those planted inside kept better than those planted outside. The season was bad for ripening, being the worst we have had for forty years.

XI. Observations on the Kumquat. By R. FORTUNE, Esq.

At our last meeting I was called upon, somewhat unexpectedly, by Mr. Wilson, Chairman of the Fruit Committee, to give some information about a very interesting little orange called Kumquat by the Chinese, which was then exhibited by Mr. Bateman. I shall now endeavour to fulfil the promise I then made.

It is rather more than a quarter of a century since I had the honour of being sent out to China in the service of the Society by the Council of that day. Before that time (1842) China had been all but a sealed-up country to the rest of the world. Two southern towns, Canton and Macao, were the only places where Europeans were allowed to visit or reside. But, although foreigners were thus restricted, some ardent lovers of botanical pursuits, and notably amongst them the late Mr. John Reeves, the father of a worthy Member of our present Council, were successful in introducing many beautiful new plants to Europe and to America. If I mention the Glycine, the Camellia, the Azalea, and the Chrysanthemum as some amongst many others which were introduced by these early pioneers, it will be seen how much our gardens were indebted to their disinterested labours. In the present day we could scarcely imagine our gardens to be complete without such ornaments; and what a void there would be were such beautiful plants suddenly removed!

In 1842, when the China war, as it was called, came to an end, and when more northerly parts of the empire were opened to Europeans, the Council of the Society naturally thought that a country which already had produced so many charming plants, in all likelihood contained many more worthy of being introduced

to Europe. Indeed rumour, which is always busy, and which sometimes exaggerates, spread abroad many reports of extraordinary productions, which botanists and horticulturists were equally anxious to possess. I well remember how in my instructions, drawn up with much care by the late Dr. Lindley, I was specially desired to look out for a blue Peony, a yellow Camellia, this Kumquat, and other remarkable plants, which were supposed to be growing and blooming unseen in the gardens of the Mandarins of the Celestial Empire. Well, rumour in this instance was not very far wrong; for I succeeded in finding a great many new varieties of Tree Peonies, some of which were lilac in colour, if not quite blue, and also a Camellia with primrose-coloured petals, although not a deep yellow; but the latter was a single-flower variety, and quite unworthy of cultivation, according to our high ideas of taste in these matters.

Amongst other plants which I discovered and introduced while on the mission was the *Citrus japonica*, or Kumquat, the plant whose fruit was exhibited by Mr. Bateman at our last meeting. I found it cultivated over a large tract of country in China; but it was evidently most at home in the more temperate parts—for example, in the islands of the Chusan archipelago and on the mainland in the same latitude. Here large plantations were met with on the lower slopes of the hills; and very beautiful they appeared in autumn, winter, and spring, when the plants were covered with their golden-coloured fruit and deep-green leaves. The fruit is much liked by the natives, who eat the skin as well as the pulp. Its chief value, however, is when used as a preserve. A large quantity is exported annually to Europe and America in china jars, preserved and sent home in nearly the same way as the better-known China ginger is sent. Such shops as those of Fortnum and Mason, in Piccadilly, have always a supply; and I believe some of the Fellows of the Society tasted the preserve in this room about two years ago, when Mr. Bateman also exhibited fruit which had been ripened in his garden.

In a horticultural point of view, however, in this country, we must look at the Kumquat as an ornamental plant only; and I really think that if our gardeners would set about its cultivation in the right way, they would find its cultivation easy, and it would amply repay them by being one of the most ornamental plants for winter decoration.

Before I point out what I believe to be the method most likely

to be attended with success in the management of the Kumquat, I have one or two observations to make on artificial cultivation generally, which I regard as most important. I believe that a knowledge of climate and other circumstances relating to a plant's natural habitat is of the first importance if we would be successful in its cultivation in this country. An allwise Providence has formed the animals and plants of our globe for those situations on the earth's surface on which they have been placed. The Indians, the Malays, or the Chinese flourish under the rays of a fierce sun which would prove fatal to the inhabitants of a more northerly climate. Some plants, as the fir tribe, flourish on the mountains or hill-sides, while others, of which rice is an example, must be grown in water. The Cocoa Palm is always found on land near the sea-shore. The Banyan tree luxuriates under a tropical sun, but would perish in a country like ours. Then, again, the plants of cool or temperate countries require a cold winter, when they can shed their leaves and have a season of rest. The period of rest required by plants in certain tropical countries, such as Bengal, for example, is not given them by cold, but by heat, and by the dryness of the atmosphere.

And, to give only one example of the natural law (for I might give many more), I may mention a class of plants whose nature it is to be in a climate which is warm and moist all the year round. The Mangosteen, which has justly been called "the king of fruit," the Nutmeg, and many other productions indigenous to the islands of the Eastern archipelago, will only succeed in such a climate as we find in that part of the world. It is always summer there, and rain falls in heavy showers almost every day throughout the year.

Here, then, is a wide field for study in which our practical horticulturists would do well to labour. For what do we really find if we enter an ordinary hot-house in some of our English gardens? We find plants of most of the countries to which I have alluded, which have been formed for, and which occupy, situations on the earth's surface so widely different, crowded together in one house, where they are treated much in the same manner as if their nature and requirements were all of a like character. Need we wonder at the results of such treatment? Some, no doubt, succeed; others struggle on for a while, then lose their distinctive character, become drawn up and weakly, and eventually resent the unnatural treatment by dying out altogether. It is to this unnatural mode

of treatment we attribute the loss of so many valuable orchids which we are now reintroducing at great expense. A more correct knowledge of their natural habitats is now enabling us to adorn so well the tables of this room at these Tuesday meetings. I may mention, as an illustration of the subject, a circumstance relating to the cultivation of the Tree Peony in China. This beautiful plant is a native of the more northerly parts of the Chinese Empire, where the winters are extremely cold. Large quantities of it are brought south to Canton and the other southern towns every autumn, where it blooms well the first year, but the first year only. The winter is too warm for its constitution; and if its cultivation is further attempted in the new climate, it only dwindles away and eventually dies. In practice, the Chinese simply throw the plants to the rubbish-heap when the blooms fade, and order from the north a fresh consignment every autumn.

In no country in the world is the artificial cultivation of the Vine more successful than it is in England. The reason of this is, that its natural requirements are thoroughly understood and supplied. When we can say the same regarding many of the tropical and other fruits which we now see so seldom, although the plants themselves have been long in our possession, those fruits will soon be common enough. In addition to the Pine and the Grape, we shall have the Mangosteen from Singapore, the Bombay Mango, the Leechee, Longan, and Yangmae of China, and a number of other fruits from various parts of the world, which will add to the enjoyment and interest of the dining-table. But, first of all, we ought to be successful with the Kumquat and some small oranges from the temperate parts of China, as they come from a climate more nearly resembling our own than that of the other plants to which I have just alluded.

In concluding this paper, which, I fear, has already been too long, I will just add a few remarks on the cultivation of the Kumquat in this country. From what I have stated of its native country you will naturally come to the conclusion that it is a much hardier plant than the Common Orange. In the country where the Kumquat is found in the highest perfection, the Common Orange will not survive the winters. And, on the other hand, the Kumquat when cultivated in the south of China does not succeed, although the Common Orange is found there in the greatest perfection. The cold winters of the north which kill the Orange are favourable to the constitution of the Kumquat: both plants require

warm summers; indeed the northern summer is frequently hotter than the southern one. A hot summer, temperature ranging from 80° to 100° (Fahr.), is necessary to enable the Kumquat to form its growth and ripen its new wood. In winter it will bear without injury from 10° to 15° of frost, and perhaps even a lower temperature than this.

Keeping in full view the principles I have endeavoured to illustrate, and taking our lessons in cultivation from nature, there ought to be no difficulty in cultivating the Kumquat in England. If we wish to have it in high health and vigour, we must keep it cold and rather dry in winter. During its season of growth in summer it ought to have a liberal supply of water and a temperature of from 80° to 100°; and this heat should be kept well up even in autumn, in order that the young wood may be well ripened.

If properly cultivated, so as to be kept in high health and induced to bear its annual crop of shining little Oranges, it would make an admirable plant for table-decoration, and would remain covered with its fruit for several months during the dullest time of the year.

Graft on *Limonia trifoliata*; do not graft on a more tender plant. It does best when planted in a border; but the Chinese can manage it in pots, and we may do so as well as Roses in pots.

XII. Mr. Pearson's Nurseries, Chilwell, near Nottingham.

By Mr. B. WYNN*.

MUCH has been said, and much has been written for and against orchard-houses, and the profitable culture of orchard-house trees.

A few days ago I had the pleasure of seeing the orchard-houses at the above-named establishment, the sight of which must at once convince the most sceptical that orchard-houses are, after all, invaluable for protecting and bringing to perfection our more tender fruits.

* When the new orchard-house at Chiswick was projected, one of the Students was sent down to Mr. Pearson's to report on the method pursued in his establishment. His Report is given here as interesting in itself and showing the creditable result of the system pursued at Chiswick with regard to the Students.

The orchard-houses here are models of their kind—roomy, elegant, and substantial, yet withal simple and useful, while the trees cultivated in them, and heavily laden with fine handsome and luscious fruit, were objects “to be seen once and thought of for ever.” The principal house is 100 feet long, and 30 feet wide; the paths are paved with diamond-shaped tiles, and bordered with a round-headed curbing, which gives to the interior a very neat appearance. There are two rows of the leading varieties of standard peaches, planted one on each side of the central path; and the remaining space is filled up with fine examples of cultivation in pots, some of which, I was informed by Mr. Pearson, had been in the same pots some eight or ten years. Objection has been made to the cultivation of trees in pots, on account of the quantity of water required, and the trouble of watering them; but this objection is applicable to all other plants grown in pots; and the pots, being moveable, afford greater facility for arranging the house in an ornamental point of view, and for making any repairs, painting, &c. The trees are not placed thickly together, each one getting an equal share of light and air, a most important desideratum in the cultivation of orchard-house trees. Nor is the practice carried out here of making up a house of bearing trees, the same plants remaining in the same house year after year; but, when a plant is sold, a young one is brought in to take its place, remaining there until it is disposed of. The compost which Mr. Pearson uses for his pot-trees consists of strong yellow loam, rotten dung, road-scrappings, and chalk, and is prepared in the following manner:—A quantity of loam and dung is brought together, the whole is then formed into a heap, by putting a layer of loam about 1 foot in thickness, and then a layer of dung in the same proportion, a layer of loam on the top of that, and so on, until the heap is completed. This is allowed to remain undisturbed for a month or two, and is then turned over regularly about once a month, until it is required for use, the whole being thus well incorporated; and, at the time of potting, chalk and road-scrappings are mixed up with it in sufficient proportions to make the whole of an open and permeable nature. The varieties more especially to be noticed, on account of their fruitful and luxuriant appearance, were the following, viz.:—of peaches, the Grosse Mignonne was very fine in size and flavour; French Galande (more commonly known as Bellegarde) was also very fine in quality and appearance. Crawford's Early, a large yellow-

fleshed peach, was also very rich and juicy. Mr. Pearson has a seedling yellow-fleshed peach, raised by himself, much superior to any other variety of yellow-fleshed peach that I have tasted; it is a fine-looking variety of decided merit and very pleasing appearance. The following were also in fine condition; but where all are good, it is difficult to say which is the best:—Royal George, Noblesse, Barrington, Ray Macker, Violette Hâtive, Early Anne, Salway, and Late Admirable.

Of Nectarines, the Downton was most conspicuous, being very large and fine; this is a splendid old variety, but is not so much cultivated as it deserves to be, Balgowan, Elruge, Violette Hâtive, and Pitmaston Orange being very fine. In one of the first houses erected here are some very fine specimens of peach-trees, planted out some fifteen or sixteen years since; they are standards, about 4 feet in height, with very large heads of the most luxuriant growth, and loaded with dozens of the finest fruit that could possibly be wished for. The borders in which these trees are planted are composed of a light-yellowish loam; they are never stirred or forked, in fact being quite hard, and are only watered when that operation is deemed necessary.

The apricots and also the cherries (of which Mr. Pearson has a fine collection in a young state) were over at the time of my visit; but I was informed that they, too, had been very prolific, and had borne excellent crops of fine fruit. Mr. Pearson kindly explained his mode of cultivation of orchard-house trees, which is very simple; and the result speaks for itself. He commences to look out for insect pests previous to the plants coming into flower; and, should there be any signs of green fly, the houses are fumigated, and the insects destroyed immediately. After the fruit is set, the trees are kept clean by the use of quassia water, prepared by boiling 2 oz. of quassia chips and 2 oz. of soft soap in one gallon of soft water, which is allowed to get cold before using. The trees are fed regularly with manure-water until the fruit is ripe; plenty of air is given at all times, and they are also mulched with chopped horse- or cow-dung; but Mr. Pearson does not recommend the taking away of three or four inches of the surface soil, and filling up with a fresh compost, as recommended by some. There are to be seen here (though not to a great extent) some fine examples of grape-cultivation; in one of the houses, and trained to the rafters over the peaches, are some half-dozen vines, of which one of them, the Muscat Hambro', was a

sight worth going a long distance to see, being in itself a perfect picture of good cultivation, and having twenty bunches, averaging in weight about 3 lbs. each, in all probability more than that. The bunches were faultless in shape, berries good-sized, and covered with a splendid bloom. These vines are planted in a very bad border, or, worse than that, none at all; and Mr. Pearson's success must be mainly attributed to his system of growing leaves, and in pinching the shoots in at the proper time, instead of allowing them to make useless wood, and then cutting them back to where they ought to have been stopped at first, which latter practice must necessarily act as a serious check upon the delicate organization of the vine. By cutting off large shoots, we throw away as useless a large quantity of valuable sap, which, by a judicious course of pinching, as adopted by Mr. Pearson, should have been properly elaborated by the foliage, and gone towards producing fine, luscious, and richly flavoured fruit. In order to obtain fine and well-coloured fruit, we must first obtain fine healthy foliage; without this good fruit is an impossibility, as these organs have to prepare the various juices previous to their entering the fruit; and without good healthy foliage it is impossible to obtain well-ripened wood *i. e.* wood the vessels of which are filled up with properly elaborated sap, which is so requisite to enable the buds to break strongly in the ensuing season. In the same house is another cane of the Muscat Hambro' grafted on the *Sarabelle frontignan*; it is scarcely recognizable, being so much altered, and is much inferior in quality, showing that the stock has some influence over the scion, if it is only for the worse.

Mr. Pearson also possesses as fine a sample of pot-vines as are to be seen anywhere,—I should think about two thousand, contained in three large houses, of well-grown canes, many of them as thick as one's finger, closely jointed, with fine prominent eyes, splendid foliage, and ripening off beautifully, giving every indication of bearing good crops next year. Mr. Pearson uses a little fire-heat, and keeps his houses airy and well ventilated, ripening the plants slowly and soundly, which is far better than the practice of turning them out as soon as full-grown, and letting them take their chance, to the detriment of the next year's crop. There are in one of the vineries here two young canes of peculiar interest, being crosses from the strawberry-grape,—one a black variety, being decidedly strawberry-scented, and the other a white one, of quite a Muscat substance, with the flavour and aroma of the

strawberry: thus, so far, Mr. Pearson has succeeded in communicating the perfume from the strawberry-grape in a remarkable degree; and to communicate this to our finer varieties would be a great acquisition. The experiment is very interesting; and no doubt the result will be eagerly watched for. Mr. Pearson's name has long been connected with that old favourite cucumber, the Long Gun; and here are some small span-roofed houses devoted to its culture, principally for seed, of which Mr. Pearson grows a large quantity, possessing, as he does, the true stock, and growing it pure, by not allowing any other variety to be near it. In one of the houses were about 200 fine fruit, ripening off beautifully, looking like great clubs more than anything else I can compare them to.

In bedding *Pelargoniums* Mr. Pearson takes great interest, and is very successful as a cross-breeder. There is here a large quantity of seedlings planted out, many of them showing rare merit; but the season having been so dry was much against their exhibiting their true character.

In the tricolor section, Duke of Wellington, Walter, and Mrs. Reynolds Hole are first-rate; Duke of Wellington has the very brightest of colours, and in shape and substance of the foliage, with such a clearness of zone, comes nearer to the standard of excellence than any other variety I have yet seen. Walter is also of the same class, but is a little lighter in colour than its more illustrious brother. Mrs. Reynolds Hole is also a very fine variety, the markings being very distinct, with very bright colours, and is the only variety I have seen that possesses so much white in the outer margin of the leaves. Lady Adeliza Norman is another fine variety of this class, of which there are so many promising seedlings here. In the Nosegay section are also some fine acquisitions in William Hill, Thomas Speed, and Septimus Thornhill. There is also a fine bed here of Bayard, a free-blooming, crimson-scarlet Nosegay, which in the distance looked very bright and gay. A bed of Pearl, a fine creamy-white variegated variety, with very light rose-coloured flowers, was very fine and effective. Chilwell Beauty looked very well; but amongst the many seedlings are some that completely put this variety in the shade.

I have one more pleasing duty to perform, that is, to testify to the kind manner in which Mr. Pearson showed me over his establishment and explained his various modes of cultivation, and also to his unbounded hospitality and great personal kindness.

XIII. On the Paradise Apple.

By J. DECAISNE, Member of the Institute of France*.

I HAVE paid great attention for many years to the questions concerning the origin of alimentary plants, and amongst others to that of Pears, Cabbages, Lettuces, and Carrots, upon which subjects I have already expressed my opinion. Allow me at the outset to say that the endeavour to establish a precise limit between the Paradise Apple and the Doucin is analogous to the search for the philosopher's stone. The flowers sent to me (those of Mr. Scott's Paradise stock) correspond to those of the Paradise Apple of some nurserymen, and to those of the Doucin of others. The truth is, that the form of the petals, the hairiness or smoothness of the styles, are as variable as the other characters presented by the plants, and as the aspect of the trees themselves. The wild Apples of our forests are in general spineless; their leaves are glabrous or pubescent; their fruits are of a yellow colour. Wild Apples never form trees in the manner that Wild Pears do under the same conditions. The Apples form rather shrubs, which have or have not creeping roots. Hence Tournefort's phrase, "*Malus pumila quæ potius frutex quam arbor, fructu candido, Pirus paradisiaca.*" This name of "Paradise Apple," or "fitchet," was mentioned as long ago as the time of Ruellius, in 1536. In the work called 'Abrégé pour les Arbres Nains' (p. 51) occurs this passage:—"Pour avoir bonne race de *P. paradis* il faut de celui qui porte des pommes toutes blanches, les autres qu'on appelle communément des bouttes-terres sont des espèces de francs qui jettent beaucoup de bois." Hence at that time the method of multiplying the Apple by cuttings was known, and the Paradise was specially recommended for the purpose. It is by no means proved that the *P. malus præcox* of Pallas is a wild species peculiar to Russia; the contrary seems shown by the total absence of any Russian name for the plant, and which it would certainly possess if it were wild. Pallas himself simply calls it by German names, while the common Apple and the *Malus baccata* have Russian, Mongolian, Tartar, and other vernacular appellations.

In Russia, as with us, the Wild Apples are generally unprovided with spines. Mr. Gelesnoff, who was kind enough to interest himself in this matter, has collected for me, from various points of the vast Russian empire, specimens of Apples, specially for the

* Copied from the 'Gardener's Chronicle,' by permission of the Editor.

purpose of enabling me to ascertain what sort it was that Pallas meant as *Malus præcox*. Generally speaking, the Russian Apples are spiny; their wood is exactly of the same colour (a brownish violet) as that of our wild plants. They are, moreover, glabrous or pubescent. I have received from the Government of Novgorod, district of Krestz, from Cherson, Charkow, from the environs of Moscow, &c. Mr. Schröder has sent me from the Jardin Agronomique of the latter city specimens which are spiny or spineless, and the same characters are met with in others which I have received from Savoy. I have received or gathered for myself Wild Apples, and I have often seen yellow and red, yellow (fructu candido) and streaked (panachée) fruits, as in our cultivated Apples. It must not be forgotten that the inhabitants of the lake-dwellings already possessed Apples (see 'Gardener's Chronicle,' 1866, p. 1068). There is not the slightest doubt on this matter, as neither the flesh nor the pips of Apples can be confounded with the pulp and seeds of other fruits—of the Pear, for instance, of which latter I have not seen a trace among the débris of the alimentary substances of these ancient races. The period of flowering offers no reliable character. We have at the present time in flower in the Museum garden Paradise Apples and Doucin Apples; and whoever has studied cultivated plants knows well that they all present early and late races. Apples form no exception to the rule. The Horse-Chestnut of the Tuilleries garden, called, by reason of its early flowering, "Mar-ronnier du vingt Mars," is an illustration, and hundreds of others might be cited. It must be remarked also that Pallas does not indicate the date of flowering of his *Malus præcox*, and that the precocity can only be attributed to the fruit "Johannis Apfel." The St. John's Apple is the analogue of our St. John's Pear, the fruit of which ripens at the end of June.

There is, then, absolutely nothing conclusive in the character taken from the precocity of the flower.

In my own opinion there is only a single species of Wild Apple in Europe, and this tree varies like all others. Nature has not two methods of procedure. She carries on her operations in the fields in the same way that she does in our gardens. She multiplies species by modifying, more or less profoundly, their forms. This is a point which seems too often ignored or forgotten. It is a mistake to suppose that our Wild Apples can be divided into two well-marked groups—the one with pubescent leaves and

sweetish fruits (*Malus communis*), the other with glabrous leaves and sour fruits (*Malus acerba*). No line of demarcation can be observed when numerous specimens from different localities are examined. I have before me bunches of Wild Apples bearing fruits and leaves, some of the latter glabrous, the others downy, although all the fruits are yellow; and I have already pointed out that for 300 years the Apple has been propagated by cuttings: a race has been established. Gardeners are too much inclined to dogmatize, and to take the exception for the rule. When they see that a particular variety does not succeed with them, immediately they jump to the conclusion that it is degenerating, and that it is so everywhere. There have been no important and comparative experiments whatever on the grafting of the Apple or of the Pear. All that has been done in this direction has been confined to individual observation, the results of which have been taken as proved without verification. What nonsense has been printed on the subject of the degeneration of varieties, and of their more or less complete recovery on the Paradise or on the Doucin, and on the Free Stock or on the Quince in the case of the Pear!

I have accumulated materials which do not permit me to adopt the theory of the transformation of one species into another, though I admit that species are very variable. The "*Malus*" remain Apples as the "*Pirus*" remain Pears, in spite of the diversity of their forms and the infinite number of their varieties. Neither do I believe in the metamorphosis of *Raphanistrum* into *Raphanus*, any more than I have credited the change from the wild form of the Carrot into the Yellow Carrot, or that of the wild Cabbage of our chalk cliffs into a cultivated Cabbage, or that of Oats into Rye, that of *Ægilops* into Wheat, &c., of which the journals contain so many accounts. Plants do not get so mixed up in Nature. I fear this letter is rather long; but the subject would require a much longer one, if time and space would permit me to treat it thoroughly.

XIV. Notes as to Locality and Culture of Tobacco*.

Communicated by the Hon. G. J. GOSCHEN.

General Contour of the Ambalema District.—A valley varying from ten to twelve miles wide near Honda to a width of about thirty or forty miles at Ibagué, bounded on the west by the central Cordillera of the Andes and on the east by the eastern range, the river Magdalena flowing along the foot of the latter. Thus it happens that the extent of land adapted to the cultivation of tobacco on the eastern bank of the river is limited, and consists of the alluvium deposited by the river between the spurs of the mountains. This soil, of course, being derived from innumerable streams which flow into the Magdalena from the primary formation of the western Cordillera and from the secondary rocks of the eastern range, contains all the ingredients of both. Towards the river's bank the soil is more sandy than nearer the foot of the hills, where it becomes somewhat clayey; but the general character of the soil on either bank of the river is a rich alluvium, derived from the primary and secondary Cordilleras of the Andes. The description given holds good, especially from Honda to Guataqué; from Guataqué upwards to the mouth of the river Bogota the geological character of the mountains bordering the river changes, and lime becomes an abundant constituent of the soil near the foot of the hills and in the valleys between them, although the alluvial soil along the banks of the rivers is very little modified by the geological character of the neighbouring hills, the drainage from these being conveyed away by quebrádas (mountain-streams), which are only supplied with water when it rains, and never overflow the land, so that any lime washed down from the hills is carried into the river Magdalena, adding of course to its fertilizing powers, of which its deposits generally participate.

The whole of the soil of the true Ambalema Tobacco district (where the best leaf is grown, and to which the cultivation of the plant was limited under the government monopoly), which includes the valley of Lagunilla, is derived from the primary rocks of the central Cordillera, mixed in some parts with the débris of volcanic rocks. A large extent of this district is occupied by a barren surface of grit and sandstone rocks with clay and pebble

* See Proceedings, p. cviii.

drifts ; and only the nooks and valleys are serviceable for tobacco. The soil is generally light but not sandy, and consists of the alluvium of the various rivers which, flowing west to east of the central Cordillera, fall into the Magdalena. This alluvium is derived from the schistose, granitic, and porphyritic rocks. Lime is present in but small quantities in a free state—that is, in the form of limestone—this stone being limited to very thin strata near the foot of the hills, enclosed within very hard rock ; it is the primary limestone, white and crystalline. But in this primary *débris* all the mineral elements necessary to tobacco are found, and only the use of the plough is required to evolve them in sufficient quantity. If the soil of the Ambalema district (the old district) is deficient in any ingredient, it is in lime ; but the Nariño tobacco grown in lime soil is not so good as the Lagunilla tobacco. But Lagunilla abounds in the *débris* of rocks yielding potash and soda, whereas the Nariño district, save what is contained of these elements in the alluvium of the Magdalena, yields principally silex and lime. One particular locality must be specially noticed ; this is the part of the Lagunilla valley which was buried by an avalanche in 1845, and which was afterwards a vast lake of mud and gravel. For years very little vegetation appeared ; but by degrees grass began to grow ; and this soil is the most fertile in the district, although there is no more vegetable soil than the result of the years elapsed since the avalanche. This soil is wholly composed of the *débris* of porphyritic granitic greenstone and schistose rocks, and produces the very best tobacco. After two or three crops, however, though the quality of the leaf is the same in regard to flavour &c., it diminishes in size through exhaustion of the soil, which, never having been exposed to the atmosphere, is but slightly decomposed near the surface. The plough is the only remedy for this case, and indeed for all the temporarily exhausted tobacco-lands which are now lying waste until rest and a new growth of brush shall restore some degree of fertility. Under the present system of agriculture, or rather want of system, large tracts of land are necessary to produce but a small proportion of tobacco. The Darmilon, Santuario, and los Rastrajos have a much greater productive capacity, and are well adapted for irrigation. The ground is laid out by nature for irrigation, and has an unlimited supply of water at hand, which only requires to be turned into the necessary channels to render the valley of Lagunilla capable of yielding

a vast quantity of valuable tobacco ; for the soil, with water, may be said to be of inexhaustible fertility ; but without ploughing and without irrigation dry weather is, like winter in Europe, the suspender of vegetation.

Temperature.—I recollect that once during my stay in Ambalema the thermometer was down to 79°, and once it was as high as 110° (in the shade). Early in the morning during winter it is sometimes at 81° or 82°, but gets up during the day to 88° or 90° or even higher. In summer it averages during the day 90° to 95°. The rain falls generally in the morning and evening, but not often during the day. In summer, but more especially during some months, say July and August, hot scorching winds prevail, which dry up the vegetation very much. To these winds the colour of the summer tobacco may be in a very great measure attributed, as when hung up it is dried by these winds in two or three days, no time therefore being left for the colour to develop itself.

Sowing.—Before sowing, the brushwood is fired (by which means of course the weeds and grass are consumed), and then the roots are partially grubbed up and the ground dug. This is considered a fair preparation. The seed is first sown in beds which can easily be watered ; and as soon as rain commences (or there is a probability of its doing so) the small plants (*almáciga*) are transplanted to the field at a distance of four square feet between each plant. The time it generally takes for a plant to thrive is from a month upwards. Very often the rain is insufficient and the plant dies or the worms eat it up. While the plant is growing, great care is necessary, and the withered leaves and worms should be picked off nearly daily, and the plant kept free from weeds. It depends on the quantity of rain that falls as to when the tobacco is fit for picking ; but about two or three months is the average. It is picked when about 3 feet high. Guano has been tried on a very small scale, but without any visible result as far as I remember. The roots of the trees, brushwood, &c. decay and form all the manure the plants ever get.

XV. On the Cultivation of Vanilla in Mauritius. By JOHN HORNE, Curator of the Botanic Gardens. (Communicated by Dr. HOOKER, F.R.S.)

IN forming a Vanilla plantation the following conditions are essentially necessary—shade, moisture, good drainage, and support for the plants.

No place ought to be selected unless it is shaded either by natural or artificial plantations. If the place be densely covered with trees and undershrubs, it will be necessary to cut down a few of the former or to thin out their branches; and all the latter that do not prevent a free circulation of air may be allowed to remain. They can be used to support the plants, which may be planted at their roots; but, for convenience in fertilizing the flowers and gathering the fruit, they should not be allowed to grow high. Shade sufficient to break partially the rays of the sun from 10 A.M. to 4 P.M., is all that is required. Lofty trees with wide-spread branches are the best. These may be fruit-trees planted thin as in an orchard or garden or in a shrubbery (with the points of the branches touching each other), or timber-trees growing in a wood.

Trees that have thick rough bark which is not often shed are the best: the roots of the plants cling to the bark, and, as they are aërial, they are supplied with a certain amount of nutriment which the plants, from their nature, might not otherwise obtain.

The preparation of the soil, and good drainage, require attention and care, as on these depends in a great measure the welfare of the plants. No site should be chosen for a plantation where the water cannot run rapidly off the surface or percolate the soil. Therefore, if the natural soil of the place be in any way retentive of moisture, it will be better to prepare the beds for the plants on its surface rather than to dig them out of the soil, as the heavy tropical rains would make each bed a cesspool or water-hole. Beds dug out of the soil can only be recommended (and that not very highly) for elevated sites that have a very light porous texture, through which the water can rapidly drain.

In preparing the beds above the soil, a good method is to put first a layer of stones on its surface and then cover them with anything that will prevent the soil from mixing with the stones and choking the drainage.

The soil is retained in the beds by rough stone walls built round their sides to the height of about 18 inches.

Whether the soil be clay or not, as digging cannot be done round the roots of trees or shrubs without injuring them, the beds should be raised round the base of the stems, and the soil retained in them in the manner just described. Where the nature of the soil will admit, the beds should be dug out to the depth of 18 inches, and constructed similarly to those which are raised above the surface. Beds on the surface of the soil are the best; but they give a place an untidy air, that does not become a gentleman's residence.

Although the vanilla is an epiphyte, it will, nevertheless, grow well in the soil, if it be of a suitable nature. If it were not for that, I doubt if it would bear such large crops of fruit as it annually does here.

The soil best suited to it is a mixture of rough peat, vegetable mould, decomposed manure, and river-sand, about equal parts of each. Add to that mixture a large quantity of leaves and small branches, in all stages of decomposition, and a quantity of rough stones varying in size up to that of a child's head. The use of the stones, sand, and branches is to keep the soil open and free, so that all its parts can be easily reached by the thick fleshy roots of the plants without being rotted. The Vanilla is easily propagated by cuttings, which may vary in length from a foot to 3 or 4 feet. This may be regulated by the quantity required, and what can be obtained. Long cuttings taken from the plants just after flowering will in all probability bear a crop the ensuing season. They are therefore preferable to short ones, which require at least two seasons before they produce much fruit. When the cuttings are short, they are generally planted in an upright position, with one or two nodes in the soil; but when they are long, about a foot of the base is laid horizontally about 3 inches or so below the surface, with the heads in an upright position. The soft tender points should be cut off, as, being in a growing state, they require a great amount of nourishment, which cannot at the time be supplied to them; the cuttings in consequence are so weakened that they take a long time to recover, and seldom make good plants. New plantations may be made at any time during the year; but the best times are at the commencement of the periodical rains, when cloudy dull weather can, comparatively speaking, be depended upon, or when the

plants have flowered. If the drainage keeps good, by laying a stem in the soil where a plant may be required, and by annually top-dressing the plants with such soil as before recommended for new plantations (less the stones), new plantations seldom require to be made.

The plants may be trained to hurdles set upright as in a fence; or two of them may be joined at their tops and set apart at the base in the form of a triangle; or they may be laid flat, and supported about a foot or so above the ground by stakes driven into the soil, or by stones. The plants may also be trained on stone walls, or over heaps of stones, where these are abundant, or around the bases of the trunks of trees, or on small trees or shrubs. The plants must always be kept within convenient reach for fertilizing the flowers and for gathering the fruit. The hurdles may be made of any sort of wire stretched on a frame, allowing about a foot between each wire; or they may be made of wood.

It is better to allow the stems to grow to a great length and to turn them about where there are places for them, than to cut off their points. That ought not to be done unless the tops are required for cuttings, or to entice the stems to branch and quickly cover the trellis. As a rule, the Vanilla bears its fruit on the stems of the previous year's growth; but so long as any buds have neither produced flowers nor wood, they may still do so. They seldom or never produce either of these from where they had formerly done so. It may be, however, that time (two or three years) is required for another set of buds to form in the places of the former ones.

In fertilizing the flowers, the sepals and petals must not be removed. It is necessary to observe that there is a septum between the pollen-mass and stigma, which covers the stigma and prevents the pollen-mass from reaching it without the agency of insects.

The method adopted here, and I have heard of no other, is to lay the "septum" underneath the staminal lid. This is very simply and easily done, by any one, with either the point of a quill or a fine-pointed stick. We place whatever may be used across the septum, and press it gently against the staminal lid, which, having a natural spring, if I may use the term, rises with the least pressure and falls again into its original position, but with the septum underneath it. Then, when the "septum" is in

that position, we press them gently between the finger and thumb, which will prevent the septum from rising and coming again between the stamen and the stigma.

As the flowers only last a day, the fertilizing must be attended to every morning, when the flowers have just opened. If very fine fruit is desired, no more than nine should be allowed to grow on one spike.

The fruit requires about three or four months to attain maturity, which is easily known by its turning yellow at the ends; or sometimes it may have a yellowish tint all over; and it should be gathered as it ripens every day, or every two days at the utmost, the most advanced only being collected. When the fruit commences to ripen, it often splits at its lower end. As a precaution against splitting, the end should be tied with a thread, or something that is soft and tough, passed round it two or more times, and tightened as the fruit matures on the plant or when it is drying or curing.

The valves of split fruit are sometimes reunited by putting the split part into lukewarm water and then tying them tightly together. By allowing the fruit to split, it loses its aroma, and consequently its market value.

When the fruit is gathered, in Mauritius and Reunion, it is scalded in nearly boiling water for about twenty seconds, if the fruit is put into it in quantity and in baskets. Fifteen seconds is sufficient for a single fruit. The fruit is then laid out to drain on something that will quickly absorb the moisture; or it may be laid on a flannel cloth, and gently patted between the hands until dry. It is then laid out on tables, covered with coarse cloth, and exposed to the sun for six or eight days, or according to the drought and sunshine, and taken in every night for fear of rain &c.

When the fruit has become shrivelled and of a brown chocolate-colour, it is laid on tables covered with cloth in a shaded well-aired room or shed until it is sufficiently dry for packing.

While the fruit is being exposed to the sun, every day about two or three in the afternoon, and when it is hot, it requires to be pressed rather hard between the fingers, so as to make the pod of a regular size and to regulate the oil and seed that it contains, which are most abundant at its lower end, all over it.

When the pods have attained the required dryness, they are kept loose in tin boxes, and are occasionally aired and any

mouldiness is wiped off them, until they are required for exportation. They are then tied into bundles of about fifty pods each. The pods in each bundle should be as near as possible of an equal size. The bundles are generally exported in boxes lined with tin, soldered down and made air-tight, and of such a size as to fit the length of the bundles when standing on their ends. Each box contains about sixty bundles.

In Ceylon, where the climate is damp at the season the fruit is ripening, the pods are killed (as they are gathered off the plants) by exposure to the sun on tin plates in a place where there is no great current of air. After being scorched by a hot sun for a few hours, the pods are allowed to dry gradually on tin plates where there is a free current of air. During the scorching and the drying, the pods are frequently turned.

When the pods are killed in this manner, they are not so liable to mildew and mould as when they are killed by scalding.

XVI. On the Effects of Frost on Vegetation at Melbourne.

By F. Von MUELLER, M.D., F.R.S.

Melbourne Botanical Gardens,
October 10, 1868.

In submitting the following observations in reference to the effect of occasional night-frosts on the plants in the vicinity of Melbourne, I have a twofold object in view. It appeared to me desirable to give to British horticulturists thus an additional opportunity of considering in what manner, in the latitude of Melbourne (almost identical with that of Auckland, and not very different from that of Cape Town and Buenos Ayres), plants can be readily associated for outdoor culture. Then, also, it appears to me not without value to give a brief record of the effect of a frost experienced here this season, more severe than any other of which we have any record here. The thermometer sunk, on the 12th of July 1868, to 27°·4 Fahr. in the air, and to 24° Fahr. on grassy surfaces.

Comparing in the following brief list the effect of this temperature on various plants, I have given notes which might appear to stand in contradiction to each other. But this is easily explained when it is borne in mind that the botanic garden extends from a river bank over gentle ridges, of which the culminating point rises to 110 feet above the level of the river.

According to the degree of shelter which the valleys of these ridges afford, according to diversity in the elevation and aspect, according to the presence of some of the original Eucalyptus and Acacia trees in some portions of the ground, and according to the shelter afforded by the upgrown vegetation of tall shrubs in other portions of the garden, the effects of the frost must have been necessarily modified, especially in so extensive an area.

The particular atmospheric current at the time of a frost has also an important influence on the vegetation. Hence in some positions plants became slightly, in some severely injured; and, again, a plant which in a somewhat sheltered spot was manifestly touched by the cold, would remain uninjured in another perhaps not distant but more favourable locality. All the perennial herbaceous plants which are here recorded as severely injured, sprung from the root again, while the shrubs or arborescent species were uninjured by the transient frost in their stem or main branches. Small plants of such may, however, entirely succumb. A rough bower, crudely constructed of boughs, affords to the more tender plants a temperature approximately 4° higher than that of the open ground. Hence Cinchonæ, Coffee, and many other prominently utilitarian plants intended for the warm fern-tree gullies of our ranges, would scarcely be affected under such cover, while the same species exposed to the full inclemency of the weather, and particularly if subjected simultaneously to a current of wind, would be extremely injured.

It may not be without interest to extend these observations, especially as they may be utilized as indications of hardiness of plants in South Europe and other countries of similar climate; and it may not be fruitless to give hereafter, also, a record of the effect of the hot sirocco-like winds on the vegetation annually so tryingly experienced. So also may it be of interest to promulgate the records kept in this garden with reference to the times when plants from all the colder, temperate, and subtropical zones are bursting into bloom.

List of some plants in the Melbourne Botanic Gardens which were not affected by frost.

Lowest temperature, July 12, 1868, $27^{\circ}4$ Fahr. in the air,
 24° Fahr. on the grass.

Aberia Caffra.
Achras Australis.

Adenocarpus Cebennensis.
Adriana acerifolia.

- Adriana* Billardieri.
Agave Americana.
Aloe soccotrina and several other species.
Alectryon excelsum.
Amyris terebinthifolia.
Anagyris foetida.
Anthyllis barba-Jovis.
Arbutus Unedo.
Arctotis grandiflora.
Areca sapida.
Argania sideroxylon.
Aristotelia racemosa.
Aspalathus sericeus.
Aster Traversii (Olearia).
 — nitidus (Olearia).
Azalea Pontica.
Azara integrifolia.
Backhousia myrtifolia.
Banksia grandis.
Berberis Aquifolium.
 — Bealii.
 — Darwinii.
 — Fortunei.
Beyera viscosa.
Bologna lucida.
Brachychiton acerifolium.
 — Delabechei.
 — luridum.
 — populneum.
Brachysema lanceolatum,
 — melanopetalum,
 and other species.
Bubon Galbanum.
Bupleurum fruticosum.
Buddleia dysophylla.
 — globosa.
 — Madagascariensis.
 — saligna.
 — salicifolia.
Callicome serratifolia.
Camellia Japonica.
Cassia artemisioides.
 — lævigata.
 — tomentosa.
Ceanothus azureus.
 — thyrsiflorus.
Ceratonia siliqua.
Ceratopetalum apetalum.
 — gummiferum.
Chironia linoides.
Cistus, all species.
Cineraria maritima.
Citriobatus multiflorus.
Cinnamomum Camphora.
Clianthus puniceus.
Coccoloba platyclada.
Coleonema album.
Colletia Bictoniensis.
Cordylina Australis.
 — indivisa.
 — terminalis.
Coriaria Nepalensis.
 — sarmentosa.
Correa, all species.
Cotyledon orbiculata.
Crassula portulacea.
 — tetragona.
Cratægus pyracanthus.
Elæagnus latifolia.
 — argentea.
Encephalartos Altensteini.
 — Caffer.
 — Fraseri.
 — Lehmanni.
 — spiralis.
Eremophila alternifolia.
 — Brownii.
 — divaricata.
 — Freelingi.
 — longiflora.
 — bignoniiflora.
 — Sturtii.
Erica arborea.
Eriobotrya Japonica.
Eriostemon nerifolius.
 — squameus.
Escallonia macrantha.
 — Montevidensis.
 — rubra.
Euonymus fimbriatus.
 — Japonicus.
Euphorbia clava.
Eutaxia empetrifolia.
 — myrtifolia.
Exocarpus cupressiformis.
 — latifolia.
Felicia angustifolia.
Ficus macrophylla.
 — rubiginosa.
Flindersia Bennettiana.
Fuchsia conica.
 — radicans.
Gardenia florida.
 — Thunbergia.
Gastrolobium bilobum.
 — velutinum.
Grevillea Hillii.
 — linearis.
 — longifolia.
 — robusta.
Heimia salicifolia.

<i>Illicium floridum.</i>	<i>Photinia serrulata.</i>
— <i>religiosum.</i>	<i>Phygellus Capensis.</i>
<i>Kennedya Comptoniana.</i>	<i>Phytolacca icosandra.</i>
— <i>lateritia.</i>	— <i>octandra.</i>
— <i>rubicunda.</i>	<i>Pittosporum crassifolium.</i>
<i>Lagunaria Patersonii.</i>	— <i>Colensoi.</i>
<i>Lasiopetalum Baueri.</i>	— <i>eugenioides.</i>
<i>Leucena glauca.</i>	— <i>tenuifolium.</i>
<i>Logania longifolia.</i>	— <i>Tobisa.</i>
<i>Laurus nobilis.</i>	<i>Poinciana Gilliesii.</i>
<i>Leucadendron</i> , all species.	<i>Protea mellifera.</i>
<i>Livistonia Australia.</i>	<i>Prunus Lauro-cerasus.</i>
<i>Magnolia grandiflora.</i>	— <i>Lusitanica.</i>
<i>Maytenus pendulinus.</i>	<i>Psidium Cattleianum.</i>
<i>Melianthus major.</i>	<i>Ptychosperma Seaforthii.</i>
— <i>minor.</i>	<i>Rhamnus Alaternus.</i>
<i>Melicope ternata.</i>	<i>Rhipsalis Cassytha.</i>
<i>Mesembryanthemum</i> , many species.	<i>Rhus lucida.</i>
<i>Montinia acris.</i>	— <i>viminalis.</i>
<i>Myrtus bullata.</i>	<i>Rubus roseifolius.</i>
— <i>communis.</i>	<i>Rulingia</i> , several species.
— <i>Ugni.</i>	<i>Sambucus xanthocarpa.</i>
<i>Nicotiana Tabacum.</i>	<i>Schinus molle.</i>
<i>Noltea Africana.</i>	<i>Schotia speciosa.</i>
<i>Opuntia coccinellifera.</i>	<i>Senecio scandens.</i>
— <i>Ficus Indica.</i>	<i>Sempervivum arboreum.</i>
— <i>Tuna.</i>	<i>Spiræa Reevesiana.</i>
<i>Pelargonium</i> , several species.	<i>Thea Chinensis.</i>
<i>Passiflora cærulea.</i>	<i>Templetonia retusa.</i>
— <i>edulis.</i>	<i>Virgilia Capensis.</i>
— <i>incarnata.</i>	<i>Viburnum cassinoides.</i>
<i>Phoenix dactylifera.</i>	— <i>Tinus.</i>
<i>Phormium tenax.</i>	<i>Zygophyllum Morgesana.</i>

List of some plants which had their foliage and young stems or branches severely injured or destroyed by frost.

Lowest temperature, July 12, 1868, 27°·4 F. in the air,
24° F. on grass.

<i>Aphanopetalum resinsum.</i>	<i>Carissa Arduina.</i>
<i>Ageratum coelestinum.</i>	— <i>Brownii.</i>
<i>Aleurites triloba.</i>	— <i>grandiflora.</i>
<i>Barleria cristata.</i>	<i>Cantua pyrifolia.</i>
<i>Bignonia pulchella.</i>	<i>Capparis reclinata.</i>
— <i>velutina.</i>	<i>Carumbium Sieberi.</i>
<i>Bœhmeria nivea.</i>	<i>Cedrela Toona.</i>
<i>Bosea Yervamora.</i>	<i>Cestrum aurantiacum.</i>
<i>Bougainvillea spectabilis.</i>	<i>Cinchona officinalis.</i>
<i>Bouvardia triphylla.</i>	— <i>succirubra.</i>
<i>Caladium esculentum.</i>	<i>Citharoxyton subserratum.</i>
<i>Callicarpa macrophylla.</i>	<i>Clerodendron tomentosum.</i>
<i>Calycanthus macrophyllus.</i>	<i>Clianthus Dampieri.</i>
<i>Canna</i> , all the species.	<i>Coffea Arabica.</i>

- Cyperus Papyrus.
 Datura arborea.
 Dolichos lignosus.
 Dombeya Natalensis.
 — tiliacea.
 Duranta Plumieri.
 Ehretia serrata.
 Elaeocarpus grandis.
 Elaeodendron Australe.
 Ekebergia Capensis.
 Entelea arboreascens.
 Eranthemum grandiflorum.
 — variable.
 Erythrina, all the species.
 Eupomatia laurina.
 Ficus Indica.
 — macrophylla.
 — religiosa.
 — retusa.
 — vesca.
 Flindersia Oxleyana.
 Fourcroya gigantea.
 Fuchsia, several species.
 Goldfussia anisophylla.
 Heliotropium Peruvianum.
 Hibiscus heterophyllus.
 — liliiflorus.
 Hydrangea hortensis.
 Indigofera decora.
 Iochroma tubulosum.
 Ipomœa Batatas.
 — Horsfieldii.
 — Learii.
 Jasminum Australe.
 Lafoënsia Vandelliana.
 Lantana, all the species.
 Laportea gigas.
 Liquidambar styraciflua.
 Lophospermum scandens.
 Mertya latifolia.
 Musa Banksii.
 — sapientum.
 Panax papyrifer.
 Pavonia coccinea.
 Pelargonium cucullatum.
 — lacernum.
 — peltatum.
 — Radula.
 — tomentosum.
 Peperomia adscendens.
 — d'Urvillei.
 Pereeskia aculeata.
 Phyllanthus Ferdinandi.
 Phyllis Nobla.
 Pircunia dioica.
 Pisonia excelsa.
 Pithecolobium pruinoseum.
 Plumbago Capensis.
 — Zeylanica.
 Psidium pyrifera.
 Pteris arguta.
 Solanum argenteum.
 — Capsicastrum.
 — coccineum.
 — erythrocarpum.
 — giganteum.
 — horridum.
 — mammosum.
 — marginatum.
 — robustum.
 Sophora Japonica.
 Sparmannia Africana.
 Spondias pleiogyna.
 Sterculia quadrifida.
 Stillingia sebifera.
 Tacsonia manicata.
 Tecoma Capensis.
 Vitex litoralis.
 Vitis Baudiniana.
 Zizyphus mucronata.

List of some plants in the Botanic Garden of Melbourne, the foliage and young branches of which were slightly damaged by frost.

- Aberia Caffra.
 Abutilon Indicum.
 — striatum.
 — venosum.
 Acacia Cunninghami.
 Achras Australis.
 Acronychia levis.
 Adriana acerifolia.
 Alectryon excelsum.
 Aloë ciliaris.
 Amyris terebinthifolia.
 Anthocercis viscosa.
 Aster (Olearia) nitidus.
 — Traversii.
 Aucuba Japonica.
 Banksia grandis.
 Barleria cristata.
 Bauhinia Leichhardtii.
 Berberis Fortunei.
 Bouvardia triphylla.
 Brachychiton Delabechei.
 Brachylæna discolor.

- Bryophyllum calycinum.*
Buddleya dypsophylla.
Bubon Galbanum.
Busbeckia Mitchellii.
Calycanthus macrophyllus.
Cantua pyrifolia.
Caprosma robusta.
Castanospermum Australe.
Celastrus Australis.
 — *venenatus.*
Cereus nycitalus.
Cestrum elegans.
 — *fasciculatum.*
Cinnamomum Camphora.
Citrus medica.
Cordylone canniifolia.
 — *indivisa.*
Corethrostylis Schulzeni.
Coriaria sarmentosa.
Corynocarpus lævigatus.
Crassula lactea.
Cryptocarya glaucescens.
Cupania anacardioides.
Dais cotinifolia.
Daphne florida.
Diploglottis Cunninghami.
Dolichos lignosus.
Dombeya Natalensis.
Dracæna Draco.
Duboisia myoporoides.
Duranta Plumieri.
Ehretia lævis.
Elæagnus argentea.
Elæocarpus cyaneus.
Entella arborescens.
Eranthemum variabile.
Eremophila alternifolia.
 — *maculata.*
Eucalyptus calophylla.
 — *cornuta.*
 — *marginata.*
Eugenia Ventenatii.
 — *myrtifolia.*
Eustrephus latifolius.
Ficus macrophylla.
 — *rubiginosa.*
Flindersia Bennettiana.
Forstythia viridissima.
Gardenia Fortunei.
 — *globosa.*
 — *latifolia.*
 — *spinosa.*
 — *Thunbergia.*
Gomphocarpus arboreus.
Grevillea Hillii.
 — *longifolia.*
Grevillea robusta.
Grewia Occidentalis.
Hakea saligna.
Hibiscus splendens.
Hovenia dulcis.
Hymenosporum flavum.
Ipomæa Horsfieldii.
Jasminum grandiflorum.
Kennedyia rubicunda.
Kerria Japonica.
Lafoënsia Vandelliana.
Lagerstroemia Indica.
Leycesteria formosa.
Ligustrum Nepalense.
 — *ovalifolium.*
Lippia citriodora.
Logania longifolia.
Maurandia Barclayana.
Metrosideros tomentosa.
Michelia Champaca.
Nandina domestica.
Panax palmaceus.
 — *papyrifer.*
Pavonia coccinea.
Pelargonium peltatum.
 — *tomentosum.*
Petræa volubilis.
Photinia serrulata.
Phyllanthus Ferdinandi.
Pircunia dioica.
Pisonia excelsa.
Pistacia Lentiscus.
 — *Terebinthus.*
Pittosporum revolutum.
 — *undulatum.*
Platycerium grande.
Plumbago Capensis.
 — *Larpenæ.*
 — *Zeylanica.*
Podocarpus elata.
 — *Totarra.*
Poinciana Gilliesii.
Polygala myrtifolia.
Pomaderris elliptica.
Psidium Cattleyanum.
Psoralea tenax.
Ptychosperma Seaforthia.
Quercus glabra.
Rhus lævigata.
Rhynchospermum jasminoides.
Richardia Æthiopica.
Ricinus communis.
Sarcopetalum Harveyanum.
Schmidelia Natalensis.
Schotia latifolia.
Senecio Bedfordii.

Solanum atropurpureum.
 — *auriculatum*.
 — *coccineum*.
 — *ferox*.
 — *jasminoides*.
Sollya heterophylla.
Sparmannia Africana.
Statice imbricata.
Stenocarpus sinuosus.
Stigmatophyllum ciliatum.

Swainsonia Greyana.
Tacsonia manicata.
 — *pinnatistipula*.
Tabernæmontana coronaria.
Tetranthera ferruginea.
Thea Chinensis.
Tristania conferta.
 — *laurina*.
Viburnum Chinense.
Zizyphus mucronata.

XVII. On the Esculent Fungi of America. By Dr. M. A. CURTIS, in a Letter to the Rev. M. J. BERKELEY.

DEAR SIR,—You have asked me to give you my “experience with the eatable Mushrooms of America.” This will be most satisfactorily done, I presume, in pretty much the same style in which I would narrate it to you at your fireside. My experience runs back only about twelve or fifteen years. You may remember that, previously to this period, I expressed a fear of these edibles, as I had grown up with the common prejudices against them entertained by most people in this country. Having occasionally read of fearful accidents from their use, and there being abundance of other and wholesome food obtainable, I felt no inclination to run any risks in needlessly enlarging my bill of fare. Thus I had passed middle life without having once even tasted a Mushroom.

But as, under your guidance and assistance, my knowledge of Fungi increased, a confidence in my ability to discriminate species grew up with it, and a curiosity to test the qualities of these much-lauded articles got better of timidity. And now, I suppose, I can safely say that I have eaten a greater variety of Mushrooms than any one on the American Continent. I have even introduced several species before untried and unknown. From the beginning of my experiments, however, I have exercised great caution, even with species long recognized as safe and wholesome. In every case I began with only a single mouthful. No ill effect following, I made a second essay with two or three mouthfuls, and so on gradually until I made a full meal of them. Fortunately I have never blundered upon any kind that was mischievous, although I have eaten freely of forty species. This is due, perhaps, to my general acquaintance with species which

have long been used in Europe, as I have made no experiments upon new species which had not some affinity or analogy with them.

For instance, *Agaricus campestris* and *arvensis* being wholesome, I did not doubt that *A. amygdalinus* (a new species closely allied to *A. arvensis*) might be safely attempted; and it has proved equally safe and palatable: indeed this may be regarded as the safest of all species for gathering, as it can be discriminated from all others even by a child or a blind person. Its taste and odour are so very like those of Peach-kernels or Bitter Almonds, that almost invariably the resemblance is immediately mentioned by those who taste it crude for the first time. This flavour is lost by cooking, unless the mushroom be underdone. When thoroughly cooked, I cannot myself distinguish it from *A. campestris*. One or two persons have expressed the opinion that they can distinguish it, and that it is not quite so good. Others, again, are equally positive that it is better. In the crude state I deem it the most palatable of all Mushrooms, as it leaves a very grateful after-taste upon the palate, fully equal to that of Almonds. This is the thing I sent you some years ago for cultivation, but which failed to grow. I very much wish it might be propagated in England, so that we might ascertain whether it would undergo any change of qualities in a different soil and climate. I have, for some time, been entertaining the suspicion that such is the case with many of our species. Thus, in European books, the Morell is described as possessing a peculiar flavour that has given its name to the Morello Cherry. I can detect nothing of the sort in our Morell. You speak of *Ag. Cesareus* (in 'Introd. Crypt. Bot.') as being "perhaps the most delicious of all Fungi." This grows in great quantities in our Oak forests, and may be obtained by the cartload in its season; but to my taste and that of all my family it is the most unpalatable of all our Fungi, nor can I find many of our most passionate mycophagists who will avow that they like it. I have tried it in almost every possible mode of cookery, but without success. There is a disagreeable saline flavour that we cannot remove nor overlay.

In the *Tricholoma* section, in which are several species long known as edible, I did not hesitate to experiment upon any that had the odour and taste of fresh flour. I began with *A. frumentaceus*, not learning from books whether it had been eaten in Europe. To this I subsequently added three new American

species belonging to the same group. All are excellent when stewed, and are especially valuable for their appearance in late autumn, even during hard frosts, when other Agarics are mostly out of season.

Again, there seemed such a similarity of texture and habit between *A. cespitosus* (*lentinus*, Berk.) and *A. melleus*, although the former belongs to *Clitocybe*, that the temptation to a trial of it was irresistible. As it is found here in enormous quantities, and a single cluster often contains from fifty to a hundred stems, it might well be deemed a valuable species in a time of scarcity. It would not be highly esteemed where other and better sorts can be had, but it is generally preferred to *A. melleus*. I have found this species very suitable for drying for winter use.

Among *Boleti* I ventured, in ignorance if it had ever been eaten, to try *B. collinitus* on account of its close relationship with *B. flavidus*. I am not particularly fond of Boletes; but this species has been pronounced *delicious* by some to whom I have sent it.

So, among the Polypores, I have no fear of harm from the use of a new American species (*P. poripes*, Fr.) on account of its relation to *P. ovinus*, of its texture, and its flavour. The taste of the crude specimen is like that of the best Chestnuts or Filberts. It has been compared even with the Cocoa-nut, and is certainly of very agreeable flavour. It does not, however, make a superior dish for the table, being rather too dry, but it is innocent and probably nutritious.

Of the *Merisma* group of Polypores, having already tried *P. frondosus*, *confluens*, and *sulfureus*, I ventured, after some hesitation and with more than usual caution, to test the virtues of a new American species (*P. Berkeleyi*, Fr.), notwithstanding the intense pungency of the raw material, which bites as fiercely as *Lactarius piperatus*. When young, and before the pores are visible, the substance is quite crisp and brittle; and in this state I have eaten it with impunity and with satisfaction, its pungency being all dissipated by stewing. I do not, however, deem it comparable with *P. confluens*, which is rather a favourite with me, as it is with some others to whom I have introduced it. *P. sulfureus* is just tolerable,—safe, but not to be coveted when one can get better. When I say safe, I mean not poisonous. I cannot recommend it as a diet for weak stomachs, which should be said of some other Fungi of a similar texture. I am here

reminded of an experience I had some three or four years ago with this species, which would have greatly alarmed me had it happened at an earlier date in my experiments, and which would probably have deterred any one unused to this kind of diet from ever indulging in it again. I had a sumptuous dish of it on my supper-table, of which most of my family, as well as a guest passing the night with us, partook very freely. During the night I became exceedingly sick, and was not relieved until depleted of my supper. My first thought, on the accession of the illness, was of *Polyporus sulfureus*. But as I remembered that inflammation was one of the symptoms of Fungus-poisoning, and I could detect no indications of this in my case, I soon dismissed the rising fear, did not send for a doctor, nor take any remedy. Others, who had partaken of the Fungus more freely than myself, were not at all affected; and I presume my sickness was no more induced by the Polypore than by the bread and butter I had eaten. And yet, had I alone partaken of the dish, or had one or two others been affected in like manner, doubtless the night attack would have been very confidently attributed by some to the Mushroom. Or, had this been my first trial of that article, possibly I might ever after have regarded it with suspicion. I learned, a few days afterwards, from one of our physicians, that this kind of sickness was then somewhat prevalent in the community, and could be attributed to no known cause. For the credit of this species, therefore, we were fortunately able to distinguish the *post hoc* from the *propter hoc*.

There are families in America that for generations have freely and annually eaten Mushrooms, preserving a habit brought from Europe by their ancestors. In no case have I heard of an accident among them. I have known of no instance of Mushroom-poisoning in this country, except where the victims rashly ventured upon the experiment without knowing one species from another.

Among the families above mentioned, I have not met with any whose knowledge of Mushrooms extended beyond the common species (*A. campestris*), called *Pink Gill* in this country. Several such families live near me, but not one of them was aware, until I informed them, that there are other edible kinds. Everything but the *Pink Gill* which had the form of a Mushroom was to them a *Toadstool*, and poisonous. When I first sent my son with a fine basket of *Imperials* (*A. Cesareus*) to an intelligent physician

who was extravagantly fond of the common Mushroom, the boy was greeted with the indignant exclamation, "Boy, I would not eat one of those things to save your father's head!" When told that they were eaten at my table, he accepted them, ate them, and has eaten many a one since, with all safety and with no little relish. Since that time our mycophagists eat whatever I send them, without fear or suspicion.

I have interested myself to extend the knowledge of these things among the lovers of Mushrooms, and also their use among those who have not before tried them. In the latter work I am not always successful, on account of a strong prejudice against vegetables with such contemptible names, and an unconquerable fear of accidents. Yet, as in my own case, curiosity often conquers these errors. When away from home I have frequently obtained ready permission from a kind hostess to have cooked a dish of Mushrooms that I have found on her premises. It has rarely occurred in such cases that the dish then tasted for the first time was not declared to be *delicious*, or the *best thing ever put into the mouth*. This latter phrase was once used in reference to so indifferent an article as *A. salignus*. Indeed, I have found several persons who class this among the most palatable species. To such persons a dish of fresh Mushrooms need seldom be wanting, as this one can be had every month of the year in this latitude. I am induced to believe that the quality of this species varies with the kind of wood it grows from, and that it is better flavoured when gathered from the Mulberry, and especially from the Hickory, than when taken from most other trees. Its fitness for the table seems also to depend much upon the rapidity of its growth, those which grow slowly, as is the case with some of our garden vegetables, being of tougher texture and of less delicate flavour. A warm sun, after heavy rains, brings them out in greatest perfection.

* I have several times been asked by persons eating Mushrooms for the first time whether these things belong to the vegetable or animal kindom. There is certainly a very noticeable resemblance in the flavour of some of them to that of flesh, fish, or mollusk, so that the question, as founded merely on taste, is not an unnatural one. But I was much struck with its propriety when reading an article in 'Fraser's Magazine' a few years since, written by the late Mr. Broderip, who therein says that Mushrooms contain osmazome. If this be so, it accounts both for their

flavour and for their value as food. Of this latter quality I had become so well convinced that, during our late war, I sometimes averred (and I doubt if there was much, if any, exaggeration in the assertion) that in many parts of the country, I could maintain a regiment of soldiers five months of the year upon Mushrooms alone.

This leads to a remark, which should not be overlooked, upon the great abundance of eatable Mushrooms in the United States. I think it is Dr. Badham who boasts of their unusual number in Great Britain, stating that there are thirty edible species in that kingdom. I cannot help thinking that this is an underestimate. But if the Doctor is correct, there is no comparison between the number in your country and this. I have collected and eaten forty species found within two miles of my house. There are some others within this limit which I have not yet eaten. In the 'Catalogue of the Plants of North Carolina' you will find that I have indicated 111 species of edible Fungi known to inhabit this State. I have no doubt there are forty or fifty more, as the Alpine portion of the State, which is very extensive and varied, has been very little explored in search of Fungi.

In October 1866, while on the Cumberland Mountains in Tennessee, a plateau less than 1000 feet above the valley below, although with little leisure for examination during the two days spent there, I counted eighteen species of edible Fungi. Of the four or five species which I collected there for the table, all who partook of them, none of whom had before eaten Mushrooms, declared them most emphatically delicious. On my return homeward, while stopping for a few hours at a station in Virginia, I gathered eight good species within a few hundred yards of the dépôt. And so it seems to be throughout the country. Hill and plain, mountain and valley, woods, fields, and pastures swarm with a profusion of good nutritious Fungi, which are allowed to decay where they spring up, because people do not know how, or are afraid, to use them. By those of us who know their use, their value was appreciated, as never before, during our late war, when other food, especially meat, was scarce and dear. Then such persons as I have heard express a preference for Mushrooms over meat had generally no need to lack grateful food, as it was easily had for the gathering, and within an easy distance of their homes, if living in the country. Such was not always the case, however. I remember, on one occasion during the

gloomy period when there had been a protracted drought, and fleshy fungi were to be found only in damp shaded woods, and but few even there, I was unable to find enough of any one species for a meal. So, gathering of every kind, I brought home thirteen different sorts, had them all cooked together in one grand *pot pourri*, and made an excellent supper. Among these was the Chanterelle, upon which I would say a few words in confirmation of what I have already said upon the varying qualities of Mushrooms in different regions and localities. You have somewhere written of this Mushroom as being so highly esteemed a delicacy, that it is much sought for when a dinner of state is given in London. Can this be because it is a rarity (for nothing common and easily obtained is deemed a delicacy, I believe), or because you have it of finer flavour in England? Here, where it abounds, no one seems to care at all for it, and some would forego Mushrooms entirely rather than eat this. It certainly varies much in quality, as I have occasionally found it quite palatable, and again, though cooked in the same mode, very indifferent. I have been unable to ascertain whether this difference is due to locality, exposure, shade, soil, moisture, or temperature. That soil has much to do with the flavour of some species of Mushrooms I am well convinced. In a parcel of *Pink-gills* I have sometimes found one or two specimens, though perfectly sound, of such unpleasant odour and taste as would spoil a whole dish. So also with the Snowball (*A. arvensis*), of which I annually find a few beautiful specimens growing near my residence upon a grassy turf, which turf covers a pile of trash made up of decomposed sticks, leaves, and scrapings from the adjoining soil. Their taste and odour is perfectly detestable. I had one specimen cooked, but no amount of seasoning could abate the offensiveness of the odious thing. Yet within a hundred yards of these I gather specimens of the same identical species which are of fine flavour, equal to that of the best Mushrooms. As I have before intimated the varying flavour of Mushrooms growing on different kinds of wood, so here I suppose the unpleasant qualities of some specimens of these two well-known and favourite species may be owing to something in the soil where they grow, which they cannot assimilate, and so it renders a palatable and wholesome species totally unfit for the table. Whether such specimens, if eaten, would be poisonous or unwholesome I do not feel any temptation to prove. It is not probable that they will ever do any mischief; for it is incredible

that any human being should so pervert his instincts as to swallow such a villanous concoction.

Experience and observations like these would perhaps justify the inference that an innocent species may sometimes be deleterious on account of its taking up some bad element from the soil. But as I have never known a case of poisoning in families that are well acquainted with the Common Mushroom or Pink-gill, that gather the specimens for themselves, and have used this article of food annually for many generations, I cannot agree with a suggestion somewhere made by you, that perhaps all Mushrooms contain a poisonous element, but some of them in such small quantity as to have no appreciable effect. Now, had you seen the quantities of stewed Mushrooms swallowed at a single meal which I seen thus devoured, and with no more harm than from the same amount of Oyster or Turtle soup, I think you would be forced to the conclusion that such an amount, even of poisonous infinitesimals, must have had some very unpleasant manifestations, or else be a very innocent diet.

It is said that the sale of the Pink-gill (*A. campestris*) is forbidden in the Italian markets, because that species has often proved to be poisonous. May not this have been occasioned by ignorant and careless collectors or by worthless inspectors? To us in America, who use this species so freely and fearlessly, the Italian's curse ("may he die of a Prataiuolo!") would have no more terror than "may he die of aromatic pain!"

Our best and standard Mushrooms are the Pink-gill (*A. campestris*), Snowball (*A. arvensis*), Peach-kernel (*A. amygdalinus*), Nut (*A. procerus*), French (*A. prunulus*), Morell (*M. esculenta*), Coral (*Clavariæ*), and Omelette (*Lycoperdon giganteum*). These are almost universally in high esteem. Yet tastes differ on these things as on fruits and vegetables, some putting one, some putting another at the head of the list, though fond of all and ever ready to use either of them, as one who prefers a peach may yet relish an apple. There are some among us who regard *A. procerus* as fully equal to *A. campestris*; and I am almost of the same opinion: when boiled or fried it truly makes a luscious morsel. I must mention in this connexion that this species here bears the name of Nut Mushroom from a quality that I do not find mentioned in the books which describe it. The stem, when fresh and young, has a sweet nutty flavour, very similar to that of the Hazelnut. Is this the case with you? Its flavour is so agreeable that

I am fond of chewing the fresh stems. From this peculiarity, in connexion with its movable ring, its form and colours, I deem it a perfectly safe species to recommend for collecting. We have no species likely to be mistaken for it, except *A. rachodes*; and I fully tested the innocence of this before commending the first to others. This has been suspected by some; but I have found it harmless. Though pretty well flavoured, it is not comparable with *A. procerus*, and the flesh is so thin and spongy that no one would choose it when those of more compact texture are to be had. *A. excoriatus*, of the same group, is a much preferable species.

The *Morell* is one of my greatest favourites, but this is not found in quantity except in calcareous districts. A few days since (April 21st) I had a dozen for supper, the largest number I ever had at one time.

The *Lycoperdon giganteum* is also a great favourite with me, as it is indeed with all my acquaintances who have tried it. It has not the high aroma of some others; but it has a delicacy of flavour that makes it superior to any omelette I have ever eaten. It seems, furthermore, to be so digestible as to be adapted to the most delicate stomachs. This is the *South Down* of Mushrooms.

In this latitude (about 36°) we can find good Mushrooms for the table during nine or ten months of the year. Including *A. salignus*, which some are quite fond of, we can have them in every month, as this species comes out during any warm spell in winter. *A. campestris* makes its appearance here as early as March, but not in full crop until September. Several excellent species of the *Tricholoma* group do not spring up until after frost sets in, and continue into December. Such is the case, too, with *Boletus collinitus*, which sometimes emerges from the earth frozen solid.

These observations and experiences are confined chiefly to the Carolinas, though I presume, from casual observation elsewhere and from information derived from correspondents in other States, that, making some allowance for difference of climate and length of seasons, what I have said is generally applicable to the whole country.

Truly and respectfully yours,

M. A. CURTIS.

XVIII. The Aloe, its Habits and Culture. By Mrs. M. E. BARBER. (Communicated by Dr. J. D. HOOKER, C.B., F.R.S., &c.)

DURING my residence in South Africa I have had much experience in the growth and cultivation of Aloes; and probably a few remarks upon their habits, growth, and culture may prove of service to those who, like myself, esteem this ornamental group of plants.

The genus *Aloë*, Linn., has a wide range in this country, its numerous species occurring in all rocky localities throughout the land; wherever rocks are found there are the Aloes also, cropping out (if I may be allowed the expression) with the geological formations of the country, as if they formed a part of them, decorating each knoll and cliff with their gay blossoms in great profusion and variety, from the gigantic Aloe of the Transkeian territory (*A. zeyheri*), which attains the height of sixty feet, and the tall graceful wood Aloes, to the sturdy stout-built Aloe of the cliff, and the minute lizardtail-like species that are scattered amongst the grass, each filling its peculiar *locale* to complete the character of the landscape and to render it truly South African in appearance.

One of the greatest peculiarities pertaining to this genus is, that although many of the species are very nearly allied, and differ but little in appearance from each other, and are also found inhabiting the same localities, yet they do not blossom simultaneously, as do many other kinds of nearly allied plants; the Aloes blossom in succession, one after another, throughout the whole of the winter months, and during a great portion of the early spring season.

The long tubular flowers of the Aloe are well supplied with nectar, and this provision affords during the winter season a continued store of food for our beautiful "sun-birds" (the numerous species of the genus *Nectarinia*); for without the supply of food afforded them by the Aloes blossoming in succession these birds could not exist during the winter.

In the cultivation of Aloes, it is well to bear in mind that they grow equally well with or without roots; there is scarcely any perceptible difference, in the time required for their reestablishment, between an Aloe carefully dug out of the ground with all its roots and a rootless branch that has been broken or

chopped off; both are at times liable to "damp off" or decay at the root.

Aloes are found growing in all kinds of soils—rich alluvial soil, leaf mould, red clay, yellow clay, hard limestone soil, brake soil, sandy soil; in fact every description of soil that occurs in South Africa has its Aloe or Aloes, provided always that it is rocky; for, as far as my observation extends, they do not grow where there are no rocks, neither will they continue to thrive for any length of time if they are planted in such localities. I attribute the great mortality among garden Aloes to this fact; it is not because the soils are unsuitable; for, as I have before stated, they will grow in almost any description of soil, if it be rocky.

I would therefore advise all who wish to cultivate these plants successfully, in the first place to excavate a moderate-sized hole, say from a foot to two feet in depth and breadth (according to the size of the specimen you are intending to plant); fill this hole with rocks, allowing some of them to project out of the ground (these should, if possible, be ornamental); then plant your Aloe amongst these rocks, fixing it in an upright position until you find that it will stand alone, then fill up the interstices with soil; any moderately good soil will answer the purpose. Do not be too liberal in your supply of water, especially at first; if the soil is moist, the Aloe will require no water at all.

After some time has elapsed, if you find that your plant is looking red and unhealthy, its root should be examined; for it may have decayed; and if this is the case, it should be taken up again, and the decayed parts carefully removed or cut away, until you arrive at the sound and healthy part of the stem: the Aloe should then be placed in the sun for several days (if the specimen is large and succulent, for several weeks), to dry and harden, before it is again put into the earth. It does not follow that the plant should be altogether lost because it has decayed at the root; for Aloes may be planted again and again, "even until seventy times seven," always taking the same precautionary measures.

Moreover you will find that Aloes will sometimes decay at the heart, or from that portion of the stem whence spring the young growing leaves; this may be from two causes, viz. water lodging amongst the too crowded leaves, or the larva of some insect that feeds upon that portion of the plant. An Aloe thus affected should have the greater portion of its leaves removed, and the diseased parts cut away, and the wound carefully

washed and dried ; after which you will soon find that your plant will recover, and either grow again from the centre or shoot from the side.

In this country we plant and transplant Aloes at all times and seasons, and they grow equally well.

Aloes should not be watered often, nor at stated periods ; for the climate of South Africa is extremely variable, and subjected to great vicissitudes, and, in their wild state, they are unaccustomed to a plentiful supply of water : they endure long seasons of severe drought, a burning summer sun, or a scorching north wind ; and, again, at other seasons they are deluged with torrents of rain ; for such is the variability of the climate they inhabit. But, from the construction of their leaves and roots, there is no succulent plant better enabled to endure these changes than the Aloe ; for, like the Vulture, who gorges himself when he has the chance of doing so, and then retires to some lonely cliff, to remain for days, or perhaps weeks, with no further sustenance, so do the Aloes in like manner in rainy seasons distend every leaf and branch with moisture, and this supply is carefully stowed away to be absorbed by degrees in times of drought and scarcity, according to the wants of the plant ; and from this store of moisture the whole of the blossoms and seeds are frequently supplied with nourishment, which supply is obtained from the large succulent leaves of the plant, which then become red and attenuated.

Aloes should never be pruned or trimmed in any way whatever ; the old leaves, which accumulate beneath the large green ones, form a protection to the young growing stems ; and if left to themselves they assume an oval-shaped mass of grey and hoary-looking dried foliage, which forms an excellent contrast with the green leaves above, giving the Aloe its peculiar and picturesque appearance. Moreover the removal of this mass of old leaves frequently results in the death of the plant, which is to be regretted.

Many of the dwarf species of Aloes are becoming much more rare within the colony than they formerly were ; for I am sorry to state that Aloes, like many other succulent plants, are fast disappearing within the boundary of the colony. The sheep and goats are doing for this country what the goats did for St. Helena, rapidly altering the nature of its flora and pasture lands, and causing many plants to disappear before their de-

structive ravages; for in severe winter seasons, when there is a scarcity of grass, these animals are in the habit of browsing upon succulent plants; and even the bitter leaves of the Aloes are eaten with avidity, cropped off all round almost into the very heart of the plant, which speedily causes the death of the specimen; and each succeeding winter season sees the rapid decrease of these fine plants*.

XIX. Note on the Leaf-coloration and Flower-production of Variegated Zonal and other Bedding Pelargoniums treated with Chemical Manures. By THOMAS MOORE, F.L.S., Floral Director R.H.S.

November 16, 1869.

At the suggestion of Major Trevor Clarke, some experiments were commenced in July last, at Chiswick, with a view to ascertain the effects of certain chemical manures on the colouring of the leaves of Variegated Zonal Pelargoniums. A set of ordinary Bedding Pelargoniums are also treated in a similar way, for the purpose of noting what would be the effect of these particular manures as regards the development of flowers. The experiments were on a limited scale, and their results have so far proved to be little more than negative—partly attributable, perhaps, to the late period at which they were commenced, and partly to the soil employed having been of too rich a quality. As, however, there were indications of differences observable, it is proposed to repeat the experiments under somewhat different conditions another year, in the hope of bringing these out more definitely.

The varieties selected for the experiments were:—*Variegated Zonals*, Mrs. Pollock—of which there were six plots, each containing four plants; *Flowering Zonals*—Herald of Spring, and Norah—of which also there were six plots, each containing three plants of the

* Mr. Wilson Saunders remarked, on the reading of this paper, that the rocky character of the soil was requisite for preventing the presence of stagnant water, a circumstance which must be carefully guarded against in cultivation. His collector, Mr. Cooper, had ascertained that many species were naturally surrounded by herbage, and that when this, and not the plants themselves, was eaten by sheep, the plants perished from exposure to the burning sun through the want of their natural protectors. He had endeavoured to obviate this in cultivation, by substituting a thin fold of muslin, which proved of great advantage to the plants.

former variety (A), and one of the latter variety (B). The plots, which were prepared and planted on July 1st, were each 20 inches square, cut off by sinking four slates, the soil being prepared 12 inches deep. They were treated with the same kind of manure, and used in the same proportions, as those employed in the series of experiments with grasses and other pasture plants now in progress, the manures having been kindly furnished by Mr. Lawes and Dr. Gilbert.

Plot 1 consisted of unmanured soil of a loamy quality.

Plot 2. The same, manured with a purely mineral mixture.

(For particulars, see Report of Meeting, August 4, 1868.)

Plot 3. The same, manured with ammonia only.

Plot 4. The same, manured with nitrate of soda only.

Plot 5. The same, manured with ammonia and mixed mineral manures.

Plot 6. The same, manured with nitrate of soda and mixed mineral manures.

The plots were examined on the 16th of August, and again on the 6th of September, when the following notes were made:—

Variegated Zonal Pelargonium—Mrs. Pollock.

Plot 1. Plants growing freely, about equal to those in plots 5 and 6.

Plot 2. Not so free or vigorous as those in plot 1.

Plot 3. Similar to plot 2.

Plot 4. The least developed, and not showing any of the improved colouring which often accompanies stunted growth.

Plot 5. Plants growing vigorously, about equal to those in plot 1.

Plot 6. Similar to plot 5.

Of the above, plots 1, 5, and 6 were the best coloured, 6 being, perhaps, a little superior to the others; but, generally, it could not be affirmed that there was any positive improvement upon the normal colouring of healthy plants.

Bedding Pelargoniums:—A. Herald of Spring; B. Norah (salmon-coloured varieties).

Plot 1. These plants grew taller and made most leaf-growth, but produced thinner and smaller flower-trusses.

Plot 2. Inferior to those in plot 1, both as to growth and flowering.

Plot 3. Similar to plot 2.

Plot 4. These were more compact in growth than those in plot 1, and about on an equality as regards the production of flowers.

Plot 5. In August these plants were the most stocky in growth and the most freely flowered; they were, on the whole, considerably more floriferous than the rest, with the exception of those in plot 6. In September the plants of A were nearly exhausted as to blossoms through the whole six lots, whilst those of B, evidently a later sort, were just coming into good bloom, and producing finer flower-trusses than those in plots 1, 2, 3, 4.

Plot 6. Not appreciably different from plot 5.

It would thus appear that, in general terms, the unmanured soil, and the soils prepared respectively with a mixture of ammonia and mineral manures, and with a mixture of nitrate of soda and mineral manures, gave the best results, whilst the results in the cases of the soils prepared respectively with the mineral mixture only, and with the ammonia only, were the least encouraging, and that wherein it was treated with nitrate of soda alone gave the least development, and seemed to favour compactness of growth.

It is proposed another season to extend the experiments over a larger area, adopting pot-culture of the plants (grown in duplicate) as admitting of an earlier commencement being made—namely, at the period of the first spring shift, when but little development has taken place, and also as permitting of a greater variety of treatment within possible limits.

XX. On the Result of Experiments in Potato-grafting.

By M. FENN.

I grafted this year Red Ashleaf on Dickson's Premier, Pater-son's Scotch Blue on Royal Albert, and *vice versa*. I have been unfortunate this season in regard to the taking of the grafts. I planted and kept the grafted sets in 6-inch pots, contrary to my later practice of planting them in the open ground when the shoots in the pots have pushed 5 or 6 inches out of the soil. This may have tended to cause non-success as regards the cicatrization of the skins; nevertheless sufficient results have been arrived at to afford conclusive evidence as to the possibility of grafting one po-

tato with the eye of another. On July 14 I examined two sets:—an eye of Royal Albert (a handsome, round, white potato) grafted on Paterson's Scotch Blue. The eye had held perfectly fast to the tuber, giving hope of some influence being exerted between the stock and the graft. I made the graft fit as perfectly as possible into the wedge-shaped cavity in the tuber; but at the above date the graft had swelled out of its first position, though not sufficiently so to disunite itself from the cicatrix of its own skin and that of the stock on one side. I gave several good tugs at the graft, but could not displace it; and I sent it to Dr. Masters for verification. Dr. Masters wrote, "in one case the cohesion was evident; but I do not see that the new tuber or haulm is at all affected. We must have more conclusive evidence. I see the union is not merely along the rinds, but in the cellular mass of the Potato as well. I have forwarded the tubers to Chiswick. The whole subject is very interesting."

The other sort sent to Dr. Masters was the eye of a Paterson's Scotch Blue grafted on Royal Albert. No cicatrix or union of the skins had been formed; but some of the young tubers were half-coloured, others less coloured, and one was perfectly white, none of them showing blue all over like the grafted sort. I asked Dr. Masters to forward them to Mr. Barron, and request him to plant them and note whether the colouring was permanent.

Now "for more conclusive evidence." I wrote on July 14 that I durst not meddle with the roots of my last year's grafted Potatos. Their appearance I noted thus:—Fenn's Onwards on Almond's Yorkshire Hero; an Onwards haulm, but earlier and very diminutive in comparison. Hero on Onwards; I can perceive no difference in the haulm as compared with those not grafted, except perhaps that the foliage of the grafted sets is of a more glazed green. Yorkshire Hero on Fluke: haulm looking like that of the true Yorkshire Hero, with not a symptom of that dark-green tinge of the Fluke foliage. Milky White on Yorkshire Hero: haulm like that of a diminutive Milky White, quite ripening off, whilst its namesake by its side was in full vigour of leaf. Milky White on Fluke (this by mistake; I intended to graft the Milky White on itself, to try what would be the effect, if any): haulm showing quite a different character from that of Milky White, not so branching, and of a darker, more upright, and robust habit. All the above examples in 1868 united at the rinds more or less completely soon after they were planted out, a fact which I proved by inspection.

I planted the above-named Potatoes on April 15, when the graft of Onwards on Hero showed sprouts decidedly greener than those of the true Onwards; and when I dug them up on August 9, their haulm was not nearly so ripe as that of the latter, and their produce, generally, for form, proved rounder than Onwards. The Milky White grafted on the Fluke is the only other decided "conclusive evidence;" and that is conclusive enough in the wrong direction, the character, as well as the Potato, being quite spoilt. In short, I may have gained (but I must wait another year to prove it) an improvement by grafting the Onwards on Yorkshire Hero; and that I fear will prove, at the most, but a mere pennyworth of Potato to a sack of trouble, though I shall be well content if by the experiment I have added my mite to the science of horticulture.

END OF VOL. II.





EXTRACTS FROM PROCEEDINGS
OF THE
ROYAL HORTICULTURAL SOCIETY
AND
MISCELLANEOUS MATTER.

August 7.—Mr. Hodge, gardener to E. Wright, Esq., sent a fine cut specimen of *Vanda Lowii* or, as it is now called by some authorities, *Renanthera Lowii*. This magnificent and remarkable species is a native of Borneo, where it was found by Mr. Low, jun., in compliment to whom it was first named. It grows to a considerable height, and from near the top of its stem it sends out several long, slender, pendulous flower-spikes, often 10 or 12 feet in length, clothed with numerous yellow and rich reddish-brown blossoms of considerable size. The spike exhibited was some 7 or 8 feet in length, and it was ornamented with thirty handsome fully developed flowers. The first two or three blossoms at the base of the spike differ from the rest not only in colour but also in texture, and are much less handsome than the others. This *Renanthera* has been in the country many years, but it was long before it produced flowers. A plant of it in Mr. Rucker's garden at Wandsworth, has borne no fewer than twelve flower-spikes at one time, which, owing to their great length, had to be festooned over the pathway, a position in which they had a very striking appearance. Messrs. Veitch and Sons exhibited *Vanda Bensonii*, so named in compliment to Lieut.-Col. Benson, Deputy Adjutant-General at Rangoon, an enthusiastic collector of plants. This blossoms freely, and is a truly beautiful species, in the way of *V. Roxburghii*, but having the yellowish sepals and petals spotted, rather than tessellated, and the less rose-coloured. They had also a remarkable *Bolbophyllum*, called *reticulatum*, from Borneo, the leaves of which looked as if they were covered all over with beautiful network, and

the flowers were chocolate-striped; an *Acineta*, provisionally named *A. Arcei*, from Central America, bearing large pendulous racemes of showy yellow flowers, different from those of any species yet in cultivation; well-bloomed examples of *Disa grandiflora*, one of the handsomest of terrestrial Cape Orchids; a pinkish-lilac variety of *Ionopsis paniculata*; *Fittonia*, or, as it also called, *Gymnostachyum Verschaffeltii*, and a variety of the same from Equador, with leaves veined with even brighter red than itself; and *Trichomanes concinnum*, a handsome Fern, with finely cut elegant fronds. From Mr. Bull came a variety of *Broussonetia papyrifera*, with leaves beautifully variegated with white; this was stated to be as hardy as the common Paper Mulberry, which is so called on account of its fibrous inner bark being used by the Japanese and Chinese for making paper; the natives also in Otaheite and other South-Sea Islands manufacture a large portion of their clothing from its bark: with it came a basket of cut blooms of *Allamanda Hendersoni*; *Tradescantia vittata*, a creeping stove-plant resembling *Cyanotis vittata* in habit, but with pretty white and green leaves; and *Sarcoglottis zebrina*, with white-striped foliage. Mr. Parker showed on this occasion *Pleopeltis incurvata*, a noble-looking evergreen stove-Fern from Java, in which the fronds are pinnatifid and the fertile ones remarkably contracted as compared with the broad coriaceous sterile ones; *Nothochlæna cretacea*, a beautiful dwarf silver Fern; the white-blossomed variety of *Agapanthus umbellatus*; and a prettily marked *Goodyera pubescens*, called *intermedia*. From Messrs. E. G. Henderson and Son came *Allamanda Schottii Hendersoni*; *Christine*, a Nosegay Pelargonium, a variety with fine trusses of rosy pink, white-eyed flowers, and nearly plain leaves; and the tricolor-leaved varieties called Lucy Grieve, Lady Cullum, and Countess of Tyrconnel. Mr. Henderson, Sion Nursery, Thornton Heath, contributed a remarkably strong shoot of the climbing variety of *Rosa devoniensis*, which bore twenty-seven flowers and buds. Mr. Chater, of Saffron Walden, contributed various Hollyhocks, both in a cut state and in the form of spikes; among the latter were beautiful examples of *E. Speed*, white flushed with red; *F. Chater*, fine yellow; and *speciosa*, buff suffused with rose. Messrs. Cutbush had a noble variety of *Lilium auratum*, called *splendidum*, remarkable for the great amount of reddish brown which had replaced the yellow in the upper part of the band. Mr. Turner furnished basketfuls of Nosegay Pelargoniums, the best of which were Duchess of Suther-

land, bearing fine heads of bright deep rose-coloured flowers of great beauty, and Lady Constance Grosvenor, a scarlet kind in the way of Stella, but brighter. *Erica Marnockiana*, with red flowers tipped with white, one of the best of recent varieties of the aristate type, was shown by Messrs. Jackson, of Kingston; and from Mr. George Smith, of Hornsey, came a *Pelargonium*, named Princess Alexandra, with the leaves boldly edged with white. Messrs. Carter and Co. exhibited specimens of a pretty free-flowering dwarf bedding *Lobelia*, called Beauty of Ravensbourne; it has rosy-lilac flowers with white centre, and will be an acquisition for the flower-garden.

August 21.—At this Meeting some interesting subjects were shown by Mr. Cripps, of Tunbridge Wells. These were:—*Forsythia viridissima variegata*, the leaves of which have a broad edge of yellow; *Hydrangea japonica elegantissima*, also handsomely variegated, the leaves being heavily blotched and mottled with yellow; *Pteris serrulata polydactyla*, a pretty fingered form of this well-known and most useful dwarf evergreen greenhouse Fern; and two fine large-flowered hybrid forms of *Clematis* (selected out of several), raised from *lanuginosa*. One of these, named *C. tunbridgiensis*, has the flowers of a reddish purple with blue bars; the other, called Lady Caroline Neville, is of a pale ashy grey with deeper-tinted bars. Mr. Bartleman had a Nosegay Pelargonium, *Emmeline*, a deep rose-pink with white eye, and bearing a fine truss; but being a yearling plant, it was sent back for proving. Mr. Keeler produced a Pelargonium, *Sambo*, which was highly admired; it is a zonale, with fine trusses of smallish well-shaped flowers of a rich velvety scarlet. In a group from Mr. Bull, the most noticeable objects were *Discorea discolor variegata*, adding to the rich colouring of the old form the further ornamentation of longitudinal silvery bands; *Adiantum velutinum*, a noble Maiden-hair from Columbia, remarkable for its ample decompound fronds and velvety rachides; and *Yucca hystrix*, a species with stiff narrow leaves, resembling *Dracena australis*. From Messrs. Low and Co. came *Oncidium cruentum*, a bright yellow species having two spots at the base of the lip. *Gladioli* were sent by Mr. Standish and Mr. J. Stevens of Solihull. The former had in his group *Basil* (a very large pale salmon-tinted flower with carmine streaks) and Dr. Hogg (a rich crimson with purple throat), both first-class sorts: the latter sent, among others, Exhibitor, a bold flower of a rich carmine-crimson, with a white throat splashed

with deep crimson. Mr. W. Paul exhibited a beautiful group of Nosegay Pelargoniums, which attracted much notice. From Messrs. Veitch and Sons came *Cattleya Manglesii*, a cross between *Harrisonia* and *Mossia*, with broad deep lilac-rose petals and a small fringed lip with a yellowish centre; it is an acquisition. Dahlias were shown by Mr. Keynes and Mr. Rawlings. Of those produced by the former, Clare Simons (blush-white with purple tips) and Butterfly (dull bronze with purple stripes) were regarded as first-class sorts; and John Sladden, evenly formed, deep maroon, from Mr. Rawlings, was adjudged second-class. Mr. Todman showed Verbena, King of the Bedders, a free-flowering crimson, of good habit for beds, and likely to be useful; and two other Verbenas, named respectively Earl of Radnor (orange-scarlet with yellow eye) and Fanny Martin (large rosy pink), were selected for approval from a group shown by Mr. Eckford.

September 4.—One of the most remarkable plants exhibited, *Amaryllis Josephina*, came from Mr. Bull. From the crown of the bulb had risen a stout thick stem, about $2\frac{1}{2}$ feet in height surrounded by a noble candelabrum-like head of not very showy flowers; but the general appearance of the plant was so striking, as to render it well worth cultivation. Mr. Bull likewise exhibited *Caladium annihilator*, with leaves prettily marbled with red and white. Mr. Smith, gardener to S. H. Norris, Esq., Altrincham, showed a spike of *Renanthera coccinea*, cut from a plant which was in full flower in the spring of last year, and which bids fair to blossom again in 1867. Messrs. Osborn sent a magnificent specimen of *Statice Frostii*, a noble variety in the way of *Holfordii*, but deeper-coloured. From Mr. Hartland, Lough Nurseries, Cork, came a small plant and cut twigs of the yellow variegated variety of *Wellingtonia gigantea aureo-variegata*; it is a handsomely marked golden variegation and appears to be thoroughly fixed. Messrs. Veitch and Sons contributed, among other things, the handsome *Maranta Lindenii* and *M. roseo-picta*; *Euonymus macrophyllus*, with handsome glossy green leaves; and examples of the charming *Retinospora obtusa aurea*. Mr. Cripps furnished *Desmodium penduliflorum*, a purplish pink-flowered hardy shrub, belonging to the Pea family, and remarkable for its graceful habit. From Mr. Cunningham, Burton-on-Trent, came a compact-growing variety of Ivy-leaved Pelargonium, with creamy-edged foliage, named *L'élégante*. Messrs. E. G. Henderson and Son contributed a well-grown fine-flowered example of *Agalmyla staminea*, a creeping

plant nearly related to *Eschynanthus*; and a beautiful tricolor-leaved *Pelargonium*, named Sophia Dumaresq, a decided improvement on Sunset. Mr. Mann, Brentwood, also showed a good tricolor-leaved *Pelargonium*, called Melona, together with Mimas, a zonal variety with good trusses of large bright scarlet flowers. Mr. George, Stamford Hill, showed a useful dwarf variety of *Tropæolum compactum*, called King of Scarlets. Mr. Keynes exhibited several *Dahlias*, of which the following were accepted as desirable sorts, namely, Paradise Williams, a medium-sized, finely formed, deep maroon crimson (first-class), and Gazelle, a large violet-shaded bronzy salmon; Vice-President, a golden-yellow, or amber-coloured kind, and Harriet Tetterell, a light-ground variety heavily tipped and flushed with purplish crimson (second-class). Mr. Eckford produced a pretty rosy-tipped light-ground *Dahlia*, named Lady Jane Ellice, and a first-class Coleshill, a large-flowered scarlet. From Messrs. Carter and Co. came various showy *Lobelias* of the *fulgens* section; and examples of the same class of *Lobelias* were also furnished by Mr. Kinghorn, from whose group Rose Queen and Crimson King, names sufficiently denoting their respective colours, were selected as acquisitions.

Messrs. Veitch contributed interesting illustrations of the different sections of Asters, both in the shape of plants and cut blooms. Among them were Giant, or Emperor, tall showy kinds; Chrysanthemum-flowered, large-blossomed sorts, very suitable for pot-culture; Hedgehog, slightly quilled, tall-growing kinds; Dwarf Pyramid, each plant of which forms quite a bouquet of flowers in itself; Truffant's Pæony Perfection, varieties with the merits of which most cultivators of Asters are familiar; the original China Aster, a tall straggling kind, which few now would care to grow; the Victoria, which, like the dwarf Chrysanthemum-flowered, is one of the best sorts either for outdoor display or for pot-culture; Ranunculus-flowered, with compact, hard, flat, button-like blossoms, each about the size of a crown-piece; Globe-flowered, with blossoms well raised in the centre; Pæony-flowered Globe, like Truffant's varieties; Imbricated Pompon, a broad-petalled kind; Reid's New Quilled in various colours, ranged round a light centre, but, as shown, not so compact as the German Quilled; Cocardeau, or Crown, a class of Asters comprising some of the handsomest of all varieties, the centre of the flower being white, surrounded by crimson, rose, violet, purple, plum, and

other shades; Dwarf Pyramid Bouquets, so compact and free-flowering as to want thinning; Pyramidal-flowering, good, showy, slightly quilled kinds; and Double Dwarf Bouquets, with medium-sized, extremely pretty, Carnation-striped flowers.

From Messrs. Downie, Laird, and Laing came an interesting collection of subtropical plants, conspicuous among which were *Wigandia caracasana*, *Solanum auriculatum*, *S. robustum*, *S. verbascifolium*, and *Polymnia grandis*, all stately large-leaved plants; *Ferula nodiflora*, with much-divided Fennel-like foliage; *Solanum pyracantha* and *decurrens*, both handsome-foliaged plants, ornamented with orange-coloured spines; *S. Fontanesianum*, a crumpled, comparatively small-leaved sort, with yellow blossoms; *Solanum amazonicum atropurpureum*, a very spiny dark-coloured sort; *Uhdea bipinnatifida*, a Mexican undershrub, with deeply cleft hairy foliage; the white-striped Japanese Maize; and the following silvery-leaved plants, viz. *Eucalyptus globosa*, *Solanum marginatum argenteum*, *S. glaucophyllum*, &c.

September 18.—A very interesting feature at this meeting was a group of about forty seedling *Aucubas*, raised from the true or green-leaved forms of *A. himalaica* and *A. japonica* fertilized with variegated males. The progeny showed all varieties of blotching and marking; but those produced from *himalaica*, having darker-green leaves and paler or brighter markings, were most promising and desirable. Mr. Eckford sent *Saccolabium Blumei*, bearing two beautiful spikes of flowers; and from Mr. Anderson, gardener to T. Dawson, Esq., Meadow Bank, came cut blossoms of *Odontoglossum grande*, which for size and brightness of colour have seldom or never been equalled; the spike bore eleven blossoms. The pale yellow-flowered *Oncidium cruentum* was shown by Mr. Ward, gardener to A. Berrington, Esq., Abergavenny. Mr. Turner, Slough, contributed a charming basketful of the new bright orange-scarlet Nosegay Pelargonium, Lady Constance Grosvenor. Mr. Cruikshanks, gardener to W. Jones Loyd, Esq., produced cut blooms of a beautiful lilac and white-striped *Verbena*, called Lady of Langleybury, which was stated to have been obtained from Purple King; if it prove to be equally good in habit with that variety, it will, doubtless, be a valuable sort for beds. Mr. Mann, Brentwood, exhibited various tricolor-leaved Pelargoniums, among which was one named *Phidias*, which, being nearly related to Golden Harkaway, a very dwarf kind, may prove useful for small beds or edgings.

Conspicuous among seedling *Dahlias*, of which several were shown, was Gem, shown by Mr. Pope, a neat purplish crimson heavily tipped with white; this was considered first-class. Lord Lyon, a good deep purple, like a pure Lord Derby; Valentine, white tipped with purple; Flambeau, yellow, heavily edged with warm brownish red, all from Mr. Turner; Hon. Mrs. Gerald Wellesley, white, heavily edged with purplish crimson, from Mr. Bragg; Mrs. Burgess, violet shaded crimson, from Mr. Burgess; a kind called Salmon; Aurora, rosy lilac, from Mr. Rawlings; and Vanguard, maroon tinged in the centre with violet, from Mr. Wheeler, were all regarded as second-class.

September 22.—Mr. Young, gardener to R. Barclay, Esq., and Mr. Bartlett, showed groups of miscellaneous plants, amongst which were fine examples of *Sedum Fabaria*, a most useful plant for the decoration of the greenhouse and conservatory in autumn.

October 2.—The most remarkable subject exhibited at this meeting was a cut specimen, from J. Bateman, Esq., of the magnificent *Cattleya Doviana* from Costa Rica. This is a plant of wondrous beauty, with large flowers like *C. labiata*, the sepals buff, the petals straw-colour, and the lip throughout of a rich mulberry-purple veined all over with golden lines. Mr. Bull exhibited *Cypripedium Schlimii*, a singular and rather pretty kind, with branched inflorescence and white blossoms mottled and flushed with rose. Mr. Bull also showed a beautiful variety of the tall herbaceous group of *Lobelias* called Ruby, with broad segments to the flower, which are of a deep rich ruby-colour, and quite novel. Messrs. Veitch and Sons had a fine specimen of *Lapageria rosea*, together with *Sarracenia purpurea* and its highly coloured reddish-brown variety called *S. atropurpurea*; also a collection of Orchids, among which were various beautiful varieties of *Cattleya*, chiefly hybrids raised by Mr. Dominy. Messrs. Francis and Co., of Hertford, produced a variety of common Jasmine, handsomely variegated with gold; it was stated to be a seedling, which had not only variegated leaves, but also a variegated stem. It was mentioned that a similar form of the same Jasmine, with the same description of variegation, was grown twenty years ago in the garden of the late Mr. J. C. Loudon, at Bayswater, where a bud of the variegated sort had been inserted in a common Jasmine; and although the bud did not take, the stock, by inoculation of the sap, afterwards broke out into the form of variegation the bud was intended to supply. Mr. Batley, of Rugby, exhibited a *Pelargo-*

nium, Salmon King, a zonale variety, of second-class merit. Messrs. E. G. Henderson furnished *Crocus nudiflorus*, violet purple, and *C. speciosus*, bluish purple, now in flower; together with a collection of zonale Pelargoniums, illustrative of the way in which they break into a variegated form.

October 18.—C. Leach, Esq., of Clapham, showed a very interesting group of *Nerines*, including the following sorts:—*N. undulata*, with small pink narrow-petalled flowers; *N. humilis*, also narrow-petalled, but with larger and deeper pink flowers; *N. Fothergillii*, with broader segments, deeper orange-red, with a darker centre to each and plane margin; *N. rosea*, with broader petals of a deep lake-rose and as large as *Fothergillii*; *N. corusca major*, a pale orange-red, large-flowered, and slightly wavy. These three have broader leaves than those previously named, and blunt at the apex. With the above was a seedling *Nerine* with broader segments than *humilis*, but of the same colour and general character. These *Nerines* form a very desirable set of plants for autumn flowering.

October 16.—From the Garden of the Society at Chiswick came a fine collection of *Zonale Pelargoniums*, whose showy blossoms even at this season make a small greenhouse in that establishment quite brilliant. *Fittonia* (*Eranthemum*) *argyroneura*, with leaves beautifully veined with white, was shown by Mr. Bull, who had also a pale yellow-flowered *Gesnera* called *G. chromatella*, and other plants, among which was *Tillandsia argentea*, an interesting new Bromeliad, with round rush-like leaves, covered so thickly over with short white hairs as to have the appearance of being loaded with hoar frost. Mr. William Paul sent a bright scarlet seedling *Zonale Pelargonium* called *Ossian*, which is remarkable not only for its compactness of growth, but also for the closeness of its heads of bloom. Mr. Morgan, Torquay, exhibited a variety of *Scolopendrium vulgare*, called *Morganii*, a beautiful crested kind in the way of *Cousensii*, but larger. Messrs. Veitch produced a beautiful new *Sarracenia*, *S. psittacina*, with red-veined pale green pitchers about 4 inches in length, spreading out horizontally from a common centre, in the form of a star, all over the surface of the pot in which the plant was growing. Mr. Leach again showed his various beautiful examples of *Nerine*, one of the most showy of which was *N. corusca major*, with light and peculiarly bright orange-scarlet flowers.

November 3.—A few well-managed *Chrysanthemums* were sent by Mr. Forsyth, of Stoke Newington, who exhibited six neat dwarf

bushy Pompons, about a foot in height and $2\frac{1}{2}$ feet across, and six neatly grown standard Pompons, on stems of about $2\frac{1}{2}$ feet high. The dwarfs consisted of General Canrobert, Cedo Nulli, Daruflet, White Trevenna, Lilac Cedo Nulli, and a bronze seedling; the standards were Andromeda, Hélène, Cedo Nulli, White Trevenna, Bob, and Golden Cedo Nulli. A stand of six tolerably good cut blooms of Chrysanthemums came from Mr. F. C. Dickens, of Flood Street, Chelsea. In a group of British Ferns from Mr. W. Earley of Digswell, was the curious dimorphous Lady-Fern *Athyrium Filix-femina Parsonsiae*. The old *Justicea speciosa*, some of the new hybrid *Bonvardias*, and *Libonia floribunda*, from the Society's Garden, were sent as useful decorative objects for the season of the year.

November 20.—Mr. Salter, of Hammersmith, produced three beautiful Chrysanthemums, namely *Countess of Warwick*, a delicate lemon-tinted white, *Lady Talfourd*, a purplish lilac, and *Faust*, a coppery brown, all first-class, full, incurved flowers. Messrs. Backhouse, of York, sent the pretty little Ecuador *Mesospinidium sanguineum*, an elegant Orchid with a slender drooping spike of rosy-pink flowers. From Mr. Shortt, gardener at Heckfield, came the yellow-berried Butcher's Broom (*Ruscus aculeatus fructuluteo*), of which a considerable patch had been found in the woods at Heckfield; and from Mr. Earley, of Digswell, a curious phyllomania *Begonia*, which had been raised between *B. incarnata* and *B. ricinifolia*. J. A. Turner, Esq., of Manchester, exhibited *Odontoglossum Hallii*; and A. D. Berrington, Esq., of Abergavenny, the pretty *Burlingtonia decora picta*.

December 4.—The most striking object at this meeting was Messrs. Veitch and Sons' plant of *Saccolabium giganteum*, a species with broad, short leaves and dense spikes of white flowers, the lip of which is tipped with deep bright purple-rose. From the garden of W. Marshall, Esq., of Enfield, came the pure white *Lycaste Skinneri alba*, which was also sent by Mr. Anderson from the garden of T. Dawson, Esq., of Meadow Bank. From the latter collection came also a remarkably fine spike of *Odontoglossum Alexandrae*, bearing a dozen flowers. Mr. Standish, Royal Nursery, Ascot, exhibited *Taxus adpressa stricta*, a free-growing, erect, evergreen shrub of the first order, and an hermaphrodite plant of *Aucuba japonica*. From G. Cooper, Esq., Old Kent Road, came *Epidendrum Cooperianum*, a species with dull brownish sepals and a rosy lip, the flowers growing in drooping spikes.

January 15, 1867.—Owing to the severity of the weather very few plants were shown. Messrs. Backhouse and Son, of York, sent cut examples of an *Oncidium* allied to *O. serratum*, with large brownish-green flowers of unusual construction, especially as regards the lip, which is small and unattractive; Messrs E. G. Henderson furnished *Sophranitis grandiflora*, and a variety of it with rosy-crimson flowers, called *Alexandrina*; and from Mr. Mann, of Brentwood, came a promising zonale Pelargonium named *Mimas*, of a soft pleasing shade of rosy scarlet, which had received a Second-class Certificate in September last, and was reproduced to show that very small plants of it flower freely, even in midwinter.

February 19.—This was a very full meeting, and many subjects of great interest were shown. The most noticeable feature was the display of *Lycaste Skinneri*, sent as a mournful tribute to the memory of the late G. W. Skinner, Esq. These were exhibited by Messrs Veitch and Sons, Mr Penny, gardener to H. Gibbs, Esq., St. Dunstons, Regent's Park, Mr. Anderson, gardener to T. Dawson, Esq., Meadow Bank, Dr. Pattison, and others. Mr. Anderson and Mr. Penny sent some remarkably fine varieties. Mr. Wilson, gardener to W. Marshall, Esq., of Enfield, contributed one of the finest series of *Catleya Warscewiczii* ever seen in public, and seeming to afford evidence that the plants frequently designated *C. pallida*, *Trianaei*, *quadricolor*, *Wagneri*, and *Warscewiczii* are all one and the same kind, varying somewhat in colour. Mr. Anderson contributed, besides the *Lycastes*, a fine group of cut Orchids, among which were *Oncidium nubigenum*, a not very showy kind, but which grows at a higher elevation than any other Oncid, nearly 14,000 feet above the sea, *Batemannia Beaumontii*, *Warrtea discolor*, *Vanda gigantea*, *Lælia superbians*, and *Epidendrum Cooperianum*, an erect-stemmed plant, with fragrant rosy-tipped flowers. W. W. Buller, Esq., showed a good specimen of *Dendrobium speciosum*, and also a small plant of the new *Dendrobium Bullerianum*, which has some resemblance in form and colour to *D. Devonianum*, but is without the fringes which impart so much additional beauty to the lip of that species. Messrs. Low and Co., of Clapton, sent *Lælia furfuracea* in great beauty, and a group of the interesting *Odontoglossum maculatum*, whose brown-sepalled yellow-lipped flowers, spotted with brownish red, are rather deficient in brilliancy. One of them, however, called *superbum*, with large flowers, and having the lip notched at the edge

and the spotting more distinctly marked, was selected for a First-class Certificate. J. Day, Esq., of Tottenham, produced a pretty new *Odontoglossum* with white flowers, allied to *O. nebulosum*. Dr. Pattison, of St. John's Wood, contributed a collection of Orchids, among which was the pretty *Odontoglossum Warnerianum*, somewhat in the way of *O. Cervantesii*. Messrs. E. G. Henderson & Son, of St. John's Wood, exhibited *Griffinia Blumenavia*, a rather pretty dwarf bulb, a most beautiful collection of *Cyclamens* of various colours, and also the sweet-smelling *Gardenia citriodora* and a curious yellowish-leaved Fuchsia, called *Golden Fleece*, raised between *Cloth of Silver* and *Enoch Arden*. Messrs. Garroway & Co., of Durdham Down, Bristol, sent the following beautiful varieties of *Amaryllis* of the *Hippeastrum* group, viz.:—*Olivia*, rich scarlet and crimson-shaded, pure light throat; *Cleopatra*, bright orange-scarlet, shaded and veined with glossy crimson, the colour reaching to the base of the segments; *H. Gibbs*, carmine crimson, with white stripe and margin; *Helena*, orange-scarlet, with slight shading of crimson; *Juliet*, bright orange-scarlet, shaded with purplish crimson; and a group of six plants of the splendid *A. Ackermanni pulcherrima*. Messrs. Veitch & Sons showed *Asplenium difforme*, a New-Holland and Norfolk-Island Fern, with remarkably coriaceous bipinnate fronds and ever-green habit, and likely to be a good basket-Fern for a greenhouse. Mr. Earley, gardener to F. Pryor, Esq., of Digswell, showed a curious *Trichosanthes*, *T. cucumerina*, which has fragrant white blossoms, margined by a thread-like fringe, and flowering freely in the stove during winter, and was considered as an acquisition for winter bouquets.

March 5.—The supply of *Orchids* was excellent, and among other interesting plants were some wonderfully fine specimens of large-flowering *Mignonette*, exhibited by the Rev. G. Cheere, Papworth Hall, St. Ives; these consisted of single plants in 48-pots, literally masses of bloom. The seeds were sown last August; they were sown in pans, the seedlings being potted off into thumb-pots, and then transferred to 5-inch pots, a little bone-dust being mixed with the soil at the time of potting. From Messrs. Veitch & Sons came *Lælia Pilcheri*, a beautiful hybrid, with white sepals and petals and a narrow acuminate fringed lip of rich venous purple edged with white, also a splendid specimen of *Ocloglyne cristata*, a most meritorious example of good cultivation, being two feet across and quite a cascade of white and

gold flowers, and only requiring to be kept cool to induce it to flower well. Mr. Parks, gardener to G. Cooper, Esq., Old Kent Road, received a Special Certificate for three beautiful specimens of *Phalenopsis Schilleriana* with unusually large flowers; these were recommended for the Lindley medal. Mr. Bull contributed the beautiful and interesting *Dalechampia Rozziana rosea*, a Euphorbiaceous plant whose rose-coloured floral leaves remain bright in colour for six weeks, and after the flowers have died away still give a cheerful appearance to the plant. Like some other plants belonging to the same family, the beauty of this plant is in its bracts, which in this case consist of two rather large ovate bright-rosy organs, which overlap the blossoms, the most conspicuous parts of which are confused trusses of abortive stamens, constituting bright-yellow, spongy masses. It comes from Vera Cruz, one of the hottest districts of Mexico, and will therefore require stove treatment. A magnificent head of flowers of *Brownea grandiceps* was shown, from the garden of Sir Hugh Williams, at Bodelwyddan. The tree which produced it was stated to be of considerable age and size, so much so, indeed, that the house in which it is growing has had to be enlarged once or twice, in order to give it sufficient room. The terminal bright-crimson flower-heads are 6 or 8 inches in diameter; the flowers are very numerous and arranged in tiers, as it were, round a conical axis, the outer ones expanding first. It is nearly related to *Amherstia* and *Jonesia*. Messrs. E. G. Henderson and Son sent a collection of *Cyclamens* of great beauty, one of them producing both rose-coloured and white blossoms from the same root, the former approaching the Persicum, the latter the Coum type. *Skimmia oblata* came from Mr. Standish; this plant formerly produced hermaphrodite flowers and an abundant crop of berries, which latter had yielded plants, of which about one-half were females, approaching near to the mother plant, which had latterly borne less perfectly developed stamens, and the other half were exactly like *S. fragrantissima*, of which only the male had been known, thus confirming the opinion that *S. oblata* and *S. fragrantissima* were the two sexes of one diœcious species.

March 19.—This was the first Spring Show, and notwithstanding the occurrence of a snow-storm in the morning, and cold north-easterly winds and showers of sleet during the afternoon, the display was most satisfactory; Hyacinths, Narcissi, Cyclamens, Primulas, Lilly of the Valley, and Roses were

wonderfully fine, considering the season, and there were large and gay exhibitions of miscellaneous plants. Hyacinths formed the most important feature of the show; and of these Mr. W. Paul, of Waltham Cross, furnished most beautiful specimens, greatly superior to those of any of his competitors. His principal collection contained magnificent spikes of King of the Blues, Princess Mary of Cambridge, Blondin, Charles Dickens, Van Speyk, Baron von Tuyl, General Havelock, Feruck Khan, Solfaterre, Koh-i-Noor, Macaulay, Vuurbaak, Prince Albert Victor, Sir Henry Havelock, Grandeur à Merveille, Snowball, Mont Blanc, and La Grandesse. Messrs. Cutbush, of Highgate, showed against these a collection in which were Baron von Tuyl, Charles Dickens, Grand Lilas, General Havelock, Cavaignac, Von Schiller, Gigantea, Princess Clothilde, Florence Nightingale, Le Prophète, Grand Vainqueur, Macaulay, Duc de Malakoff, Mrs. James Cutbush, Mont Blanc, Snowball, Princess Helena, and Haydn. Among New Hyacinths, the only exhibitor was Mr. W. Paul, whose varieties consisted of *Lord Shaftesbury*, a kind with very large single white bells arranged in a somewhat loose spike; *Blondin*, a variety in the way of Princess Mary of Cambridge, but paler, fine spike, large bells; *Prince Albert Victor*, a dark purplish-red, single flower, of great beauty; *Linnaeus*, a brilliant, deep, single crimson flower; *Bird of Paradise*, a fine yellow; and Sir Henry Havelock, a charming plum-coloured kind, which cannot fail to be a favourite. In addition to his other collections, Mr. W. Paul exhibited in the Miscellaneous class upwards of a hundred pots of Hyacinths.

Tulips made a fine display, some of the best being Proserpine, violet shaded rose; Keizer Kroon, deep red, edged with yellow; Couleur Cardinal, deep scarlet shaded with violet, small but effective; Fabiola, rosy purple and white; White Pottebakker; Van der Neer, violet shaded rose; and the old Tournsol, Duke of York, red edged with creamy white, and Vermilon Brillant. *Narcissi* were less numerous. Among them were Bazelman Major and Lord Canning, white, with a yellow cup, both fine large flowers; Gloriosa, a fine white, with a deep yellow cup; Cleopatra, with an orange cup; and in the same way, but with smaller flowers, Jocrisse, Parfaite, and Regulus.

Crocuses formed a beautiful group. Conspicuous among the different kinds were Sir Walter Scott, a large variety, lilac striped with white; Cloth of Silver; Mammoth, large-flowered, white;

Princess of Wales, a fine pure white; Princess Alexandra, white pencilled with purple; Prince of Wales, bluish violet; David Rizzio, and Sir John Franklin, purple; and Golden Yellow.

Messrs. F. and A. Smith sent *Azalea Hector*, a very dark-red kind with spotted upper petals. Mr. Fairbairn, gardener to the Duke of Northumberland, sent a seedling *Cineraria*, *Duke of Northumberland*, which appeared to be an acquisition in point of colour. Messrs. E. G. Henderson and Son exhibited a nice plant of *Rudgea leucocephala*, which also came from Mr. Bull, under the name of *Psychotria macrophylla*. The last-named exhibitor also sent *Agave Verschaffeltii macracantha*, a curious new dwarf form of American Aloes, with short thick leaves furnished with sharp teeth, and tipped by a sharp needle-like spine. Messrs. Veitch and Sons exhibited *Hippeastrum pardinum*, a beautiful new form of Amaryllid, which has expanded flowers, with a pale creamy ground-colour, thickly spotted with confluent dots of crimson-red. It is one of the gems of the season.

April 2.—In a collection of plants shown by Mr. Bull, there occurred *Litobrochia undulata*, a pretty-looking robust-growing compound Stove-Fern, from the Feejees, and the charming *Camellia Lavinia Maggi rosea*, whose flowers are self-coloured, of the richest carmine rose. W. Wentworth Buller, Esq., sent *Dendrobium thyrsoiflorum*, a handsome new species with clavate bulbs and drooping spikes of pale-yellow flowers with an apricot-coloured lip. Mr. Anderson, gardener to T. Dawson, Esq., Meadow Bank, Glasgow, furnished two forms of *Lycaste Skinneri*, namely, *Andersoni*, with rosy petals and pure white lip, and *Dawsoni*, with deep-crimson lip, marked with white blotches. Mr. Anderson also sent *Odontoglossum luteo-purpureum*, which includes as varieties both *O. radiatum* and *O. hystrix*. Mr. Jones, Whalley Range, Manchester, sent a monstrous *Cattleya* with two lips. Mr. Wilson, gardener to W. Marshall, Esq., Enfield, had a nice plant of *Odontoglossum triumphans*, a fine species, with an abruptly acuminate white lip, having yellow crests at the base and brown blotches in the upper half. He also showed a handsome variety of *Oncidium carthagenense*.

Among *Orchids* exhibited for the first time were *Oncidium amictum*, already noticed, and a pretty white *Dendrobium* from Japan, which must decidedly be considered a cool Orchid. It would produce a large mass of flowers and would doubtless succeed in a mild greenhouse. Mr. Bateman next directed atten-

tion to an experiment made by his gardener, Mr. Sherratt, the results of which were exemplified in two stems of *Dendrobium anosmum*. From one all the flowers had been stripped off but two, on the other all were allowed to remain, and the result was, that the flowers on the former were much larger than those on the latter—a result for which Mr. Bateman said he was hardly prepared; for though he knew that the flowers varied in number according to the health and strength of the plants, he was not aware that they could be thus increased in size.

April 16.—This second Spring Show was in all respects an excellent exhibition, being made up of brilliant Azaleas, Roses, Rhododendrons, Cinerarias, and other plants. The weather was, however, wet and cold. The prize group of *Azaleas*, consisted of Gem, Chelsoni, Advance, Elegantissima, Stella, and finely bloomed plants of Roi Leopold, Sir Charles Napier, Magnificent, and Iveryana; and that of *Rhododendrons* contained Augustum, delicate pink; Nero, dark rosy purple; Illuminator, with large trusses of rose-coloured flowers; Vervaeianum, semidouble, bluish lilac; Griswoodianum, blush; and Erectum, deep rose—all in excellent condition, contributed by Messrs. Lane and Son, of Berk-hempstead.

Among novelties Messrs. Veitch and Sons produced the following amongst others:—*Coleus Veitchii*, a species from New Caledonia, with handsome leaves, chocolate-coloured in the centre and edged with bright lively green; *Hypocyrtia brevicalyx* (since named *Gloxinia hypocyrtiflora*) from Ecuador, with singular-looking globular orange blossoms and small obovate leaves, veined with white; *Panicum variegatum*, a South-Sea Island plant, forming a dense mass of slender branches furnished with pretty red, white, and green-striped lanceolate foliage; and the charming purple-blossomed *Primula cortusoides amœna*, a Japan species, stated to have proved hardy in this country. Mr. William Paul contributed a yellowish-leaved Elm named *Ulmus aurea*; and the double-flowered Crimson Thorn (*Crataegus Oxyacantha coccinea flore-pleno*), a brilliant variety which cannot be too highly praised. It is a sport from the old Double Pink Hawthorn. Mr. Turner, of Slough, showed quite a large group of Seedling-*Alpine Auriculas*, the majority having dark ground-colours. Generally they were very attractive. The darkest hues were represented by *Brutus*, a bold and striking purplish violet; *Nero*, glossy maroon-crimson, with bright sulphur paste, bold and showy; *Mabel*, dark glossy

velvet edge, smooth sulphur paste, bold and striking; and *Potentate*, bright maroon-crimson, yellow paste, large and striking pip. With a brighter ground-colour were:—*Sparkler*, glossy claret-crimson, yellow paste, bright and striking; *Fredrika*, dull maroon-crimson, with bright yellow paste, bold and showy; and *Alfred Mellon*, dark-brown chocolate, with bright-yellow paste, pips large. Another group had violet, lilac, and claret grounds, and comprised, popularly speaking, some of the most striking flowers, as *Elsie*, dark ground, margined with lilac, sulphur paste; *Conspicua*, something like *Elsie*, but not so smooth; and *Pauline*, one of the very best, pale sulphur paste, circled by a velvety ring and margined with violet, very pretty indeed.

May 7.—Owing to the number and striking beauty of some of the novelties produced on this occasion, this was an unusually interesting exhibition, which was also well supported in other departments. The day, too, was most brilliant. New plants constituted the most important feature of the show. For the best six sent out in 1865 and 1866, Messrs. Veitch and Sons were first, with *Primula cortusoides amana*, bearing rich magenta white-eyed flowers as large as a florin; the beautiful *Maranta roseo-picta* and *Veitchii*, *Verschaffeltia splendida*, *Dieffenbachia Weirii*, and *Begonia Pearcei*, the latter with rich velvety dark-green leaves veined with pale green. Mr. Bull was second, with *Maranta roseo-picta*, *Verschaffeltia splendida*, a beautiful Palm, the silvery-veined *Fittonia argyroneura*, the rose-spotted *Bertolonia guttata*, *Zamia villosa*, an elegant species, and *Anthurium regale*, resembling *magnificum*, with leaves of a bronzy-green colour prominently veined with pale green. With new plants of the present year, Messrs. Veitch were again first, with *Sanchezia nobilis variegata*, a stove Acanthad with large elliptic leaves having yellow bands radiating from a yellow midrib; *Coleus Veitchii*, with dark-chocolate leaves edged with bright green; the slender *Panicum variegatum*, also from New Caledonia, with rose, white, and green foliage; *Dieffenbachia Pearcei*; *Hypocyrtia brevicalyx*, from Ecuador, with nearly orbicular silvery-veined leaves; and *Lomaria ciliata*, from New Caledonia. Mr. Bull was second, with two Peruvian *Dichorisandra*s, named *D. mosaica*, with dark-green leaves, lined transversely with pale green and brownish purple on the underside, and *D. undata*, with undulated dark-green leaves, ornamented longitudinally with pale-green bands; *Agave macracantha*, with glaucous pale-green leaves edged with bold brown spines; the elegant *Adiantum*

Lindeni, *Maranta illustris*, and *Bignonia ornata* from Rio Negro, the latter with broad lanceolate leaves, which when young are of a bronzy hue, with a rosy variegation along the midrib, but which become silvery in older foliage. For the best new plant shown for the first time in flower, the Medal was won by Mr. Bull with *Dalechampia Roezliana rosea*. The scarlet-flowered *Begonia boliviensis*, from Messrs. Veitch, whose showy flowers differ both in shape and colour from anything of the kind previously in cultivation, competed with it. The best new plant with ornamental foliage was Messrs. Veitch's *Alocasia Jenningsii*, from the East Indies, a remarkably distinct and handsome plant, having nearly heart-shaped bright-green leaves, marked with dark chocolate in sections between the veins. Mr. Bull showed *Ptychosperma regale*, a handsome East-Indian Palm. The best new garden seedling was shown by Messrs. Veitch, in the form of a pretty hybrid *Cattleya*. Of a more miscellaneous character were *Epidendrum cnemidophorum*, contributed by Mr. Muir, gardener to Sir P. de Malpas Grey Egerton, Bart., M.P.; this had three spikes of gracefully drooping flowers borne at the end of long slender stems. Messrs. Low, of Clapton, exhibited a whole bank of the beautiful *Cattleya citrina*, and a white variety of *Odontoglossum citrosimum*. Messrs. Rollisson, of Tooting, produced a very pretty Seedling Heath, *Erica tintinnabula*, a variety raised between *odorata* and *hiemalis*. Messrs. Downie, Laird, and Laing sent *Nosegay Pelargonium Rose Stella*, a variety of great merit, which will be a useful bedding-plant. Mr. William Paul sent a large collection of seedling Zonale Nosegay Pelargoniums, among which *Waltham Nosegay* and *Dr. Hogg* were most conspicuous. *Iberis carnosa*, a very dwarf plant for rockwork, came from Messrs. Backhouse, of York.

The Auricula bloom, so far as regards the London shows, culminated at this exhibition. Mr. Turner staged a fine lot of the show varieties, the trusses being generally of good average size, the pips large, smooth, and clean. There were a few flowers among them of extra fine quality, such as Lancashire Hero (Cheetham), the paste of which was very smooth, and the pips large and stout; Smiling Beauty (Heap), the dark ground-colour of which was thrown up very strikingly; Apollo (Hudson), very fine; Sophia (Chapman), ground-colour purplish violet, well defined, and smooth white paste; Belisarius, green-edged variety, forming a good pure truss, but the pips a little rough; Great Eastern

(Smith), distinct pure-yellow eye, remarkably well shouldered, fine pips; Earl Grosvenor (Lee), a very fine white-edged variety, the ground-colour dark violet crimson, with pure white smooth paste and greenish-yellow eye, fine pip and truss; Lycurgus (Smith), ground-colour bright claret-crimson, pips very bold and striking; Sir William Peel (Lightbody), fine and bold truss; and Star of Bethlehem (Lightbody), eye good and well shouldered, ground-colour purplish crimson, though somewhat running into the green edge, a very distinct variety, possessing a great deal of merit. Mr. Turner also produced Alpine Auriculas, so rich and varied as to be well worthy a close inspection, especially such as *Bertha*, pure greenish-yellow paste, with dark-crimson ground, distinctly margined on each segment of the pip with pale violet; and *Novelty*, having a pale-yellow paste, with a dark blotch at the base of each segment, with broad margin of pale violet, changing to buff with age. One of the most conspicuous flowers was *Landseer*, the ground-colour of which was a bright claret-crimson, with pale-yellow paste, somewhat rough, but having large and showy trusses freely produced, and the habit excellent.

May 21.—This was a very magnificent show of the new class of *Variegated Zonale Pelargoniums*. Among the novelties to which Certificates were awarded were *Sunshine*, which has a yellow edge and a showy flamed deep-crimson zone. This came from Messrs. E. G. Henderson & Son. Mr. Wills, gardener at Huntroyde Park, Burnley, had a very fine collection of new sorts, having for the most part large bold leaves, broadly zoned with reddish brown. Of these, *Beauty of Ribblesdale* was very conspicuous, with its large leaves having a showy vandyked reddish-bronze zone on a yellow ground; also *Her Majesty*, a vigorous-growing kind, of a yellowish brown, with a very broad even deep-brown zone. Messrs. Garaway & Co., of Bristol, had *Mrs. Allen*, which has nearly circular leaves, with a narrow golden edge and a regular crimson zone, which in the young leaves is very bright. Mr. Grieve had a very fine collection, the gem of which was a variety called *Victoria Regina*. Mr. Groom, of Ipswich, sent a beautiful tri-color, named *Lord Stanley*; and Messrs. Saltmarsh & Co. showed *Sunrise*, the latter having a compact neat habit, and otherwise a variety of first-class merit. Of other plants, Messrs. Veitch & Sons exhibited a fine collection, in which were *Dichorisandra mosaica*, *Dracæna regina*, *Adiantum concinnum latum*, *Maranta illustris*, and

Dichorisandra undata. Mr. Bull had also a good collection. A pretty Golden Elm, *Ulmus aurea*, was shown by Mr. W. Paul and Messrs. E. G. Henderson. Messrs. Osborn & Sons produced a new variety of the Royal Fern (*Osmunda regalis acutiloba*). A little tree of what is call Silver-variegated Deodar was exhibited by Messrs. Maule & Son, of Bristol. Mr. Standish exhibited his *Retinospora filifera*, a most remarkable Conifer, with long whipcord-like drooping branches. Finally, Mr. Kinghorn produced his beautiful new *Azalea*, *Lizzie*, the flowers of which are large, bold, stout, and of fine form, the colour white, flaked with rosy carmine, a very free-blooming kind; and Messrs. Osborn & Sons, of Fulham, sent the pretty little North-American *Viola pedata*, which had all the attractions of a new plant, because so very rarely seen, though introduced upwards of a century ago. The flowers are deep lilac, which becomes paler with age; it is very dwarf, and blooms profusely, but does not continue long in flower. It is, however, a pretty and effective plant for rockwork.

June 4 to 8.—This five days' great exhibition was held in the Eastern Annex, in the large Rhododendron-tent, which was literally crammed with gay flowers and fine foliage, here and there relieved by stately Tree Ferns and other subjects of a similar description. The weather proved showery. A good many seedling florists' flowers were present, as usual, at the show, and among them some fine Pelargoniums raised by the Rev. E. Foster and Mr. Hoyle. Besides these, *Silene pennsylvanica*, a dwarf rock plant, covered with bright pink flowers, came from Messrs. Backhouse. Messrs. Ivery exhibited *Polystichum angulare oxyphyllum* and the following forms of *Athyrium Filix-femina*, namely, *plumosum multifidum*, the Axminster variety of *plumosum*, and *Girdlestonii*. Messrs. Salter produced *Coprosma Bauerianum variegatum*, a pretty greenhouse shrub, with green leaves edged with pale yellow. Mr. Robert Veitch, Exeter, sent two fine specimens of the seedlings raised from *Adiantum Farleyense*. Mr. Stone, gardener to J. Day, Esq., sent a magnificent variety of *Cypripedium Stonei*, called *Platyænium*, with much broader petals than those of *C. Stonei*, which it otherwise resembles; he also exhibited *Cattleya Dowiana*, a grand species with buff sepals and petals and large violet-purple lip veined with gold. Messrs. Veitch & Sons showed, in a somewhat undeveloped state, the lovely *Dendrobium Bensoniæ* from Moulmein, and also *Alocasia intermedia*, a fine grey-leaved plant, raised between *A. Veitchii* and *A. longiloba*.

Mr. Bull exhibited a most interesting specimen of *Amorphophallus nobilis*, the singular fungus-like growth of which appeared to excite much interest amongst the visitors.

June 18.—The most remarkable subject shown at this meeting came from Mr. Anderson, gardener to T. Dawson, Esq., at Meadow Bank, and consisted of a splendid cut spike of *Odontoglossum Pescatorei*, which, however, only represented a fraction of the blossom on the plant from which it was cut, and on which no less than three hundred flowers were counted. It was wonderfully fine; as also from the same source was a plant of *Lælia majalis*, growing on thin flat tiles, whose flowers were as much as a span across. Mr. Anderson also sent the little carmine-coloured Peruvian *Odontoglossum roseum*, which, though beautiful *in minimis*, as now exhibited for the first time, was likely to be still more attractive when larger specimens were obtained. Another remarkably fine Orchid consisted of a cut specimen of *Aerides Fieldingii*, from Lord Egerton of Tatton, the most magnificent example of that species which had ever been exhibited, and to which, on the recommendation of the Committee, the Lindley Medal was awarded. This spike had 8 branches at its base. Mr. Shortt exhibited a cut specimen of the true *Pentstemon Cobæa*, a now nearly forgotten plant, with large blush-white flowers. Messrs. J. & C. Lee sent *Hypericum (chinense) monogynum*, and *Carex pilulifera foliis aureis*. Messrs. Veitch sent *Dendrobium Bensoniæ*, with a roundish orange-coloured lip bordered with white, and two blood-red spots, which is very lovely. Mr. Sherratt, gardener to James Bateman, Esq., Knypersley, sent *Miltonia spectabilis*, var. *rosea*, a very beautiful plant, with the lip marked with bars of rich deep rose. Some further examples of Messrs. Downie, Laird, & Laing's fine hybrid Nosegay Pelargoniums were produced. They were seedlings from a fertilized Stella, but all were of a different shade of colour to that of the parent plant. Among these were *Hon. G. Hardy*, having immense and well-rounded trusses of vivid orange-scarlet flowers, a fine shade of colour, excellent habit, foliage pale zonate, and free-blooming; also *Florbundum*, clear pale orange-scarlet, and *Comet*, bright cherry-crimson, which are two remarkably good varieties; the shade of colour of the former is very striking, and the trusses of great size; the flowers of the latter were stout and smooth, and the habit excellent. Mr. Whitehorn had plants and cut flowers of two varie-

ties of oak-leaved *Pelargoniums*, raised from Rollisson's Unique; they were decided improvements, in point of colour, on the parent variety. The flowers of the former, named Crimson King, were of a bright and yet deep rosy-crimson colour; those of the latter, named Constellation, were of larger size, of a vivid rosy-crimson shade, suffused with violet. When well grown, these two varieties will be great acquisitions in point of colour. Mr. W. Lee, of Hammersmith, produced a dwarf-growing *Lobelia*, of the Erinus section, named *Lee's Dwarf Blue*, the habit of which is very short and dense, like *L. pumila elegans*, and having a profusion of azure-blue flowers, with a small white spot on the centre of the flowers. It promises to be a most effective bedder.

July 2.—This was the great Rose Show, on which occasion the blooms were numerous, and shown in excellent condition, considering the unfavourable weather to which they had been subjected. We can only record here some of the more strikingly beautiful flowers in the several collections. The following were particularly good:—Jules Margottin, Sénateur Vaisse, Prince Camille de Rohan, Maurice Bernardin, Pierre Notting, Souvenir de la Malmaison, Comtesse de Chabillant, Madame Vidot, Général Jacqueminot, Madame Victor Verdier, Maréchal Niel, Sœur des Anges, John Hopper, Centifolia rosea, Baron A. de Rothschild, Céline Forestier, Devoniensis, Alfred Colomb, Prince de Porcia, Louise Magnan (white), Marie Baumann, Duc de Rohan, Gloire de Dijon, Duke of Edinburgh (dark shaded scarlet), L'élégante (velvety dark red), Xavier Olibo, Beauty of Waltham, Le Rhône, Charles Lawson, Niphetos, Charles Lefebvre, Queen Victoria (one of the prettiest of the white Hybrid Perpetuals), Triomphe de Rennes (a very beautiful yellow), Lord Macaulay, Prince de Porcia, Madame Plantier (a free-blooming Hybrid China), Comte Alphonse de Serenye (beautiful clear crimson), Prince Henri des Pays-Bas (crimson, shaded with purple), Madame Moreau (also beautiful in the bud state), Duchesse de Caylus (very good), Gloire de Santenay, La Brillante (very bright), Cloth of Gold, L'Enfant Trouvé, Comtesse de Kergolay (fine deep crimson) Madame Hector Jacquin, Souvenir d'Élise Vardon, Madame Bravy, François Lacharme. Among the new Roses of 1864 or 1865, the most striking kinds were Marie Baumann and Alfred Colomb (both very fine), Exposition de Brie, Mdle. Marie Rady, Pierre Notting, Madame Victor Verdier, Marguerite de St. Amand, Mdle. Marguerite Dombrain, Abel Grand, and Princess

Mary of Cambridge, the last four somewhat alike as regards colour, and Miss Ingram. Messrs. Veitch & Sons sent on this occasion a fine collection of new and rare plants, among which were the following:—*Croton irregulare*, a little standard, with narrow green leaves, having a yellow stripe up the midrib; *C. maximum*, with broad pale-green leaves veined with yellow; and *C. interruptum*, narrow leaves, having yellow midribs changing to red; *Dracæna Moorei*, with broad olive-brown leaves; the slender *Selaginella Poulteri*, with minute foliage; and *Begonia Veitchii*, a beautiful dwarf perennial, said to be hardy, the flowers large and of a vivid orange-scarlet, with a cluster of yellow stamens. It is remarkably showy. Mr. Edwards, of Nottingham, showed the following new and interesting British Ferns, and had First-Class Certificates for them, viz.:—*Athyrium Filix-femina Edwardsii*, *Footii*, *Polystichum angulare diversilobium Padleyi*, and *Scolopendrium vulgare Edwardsii*. From Mr. W. Paul, of Waltham Cross, came two very pretty and striking varieties of the summer-flowering herbaceous *Phlox*,—one, named *Beautiful*, had stout, smooth, round flowers of a pure white colour, with a rosy-violet centre; and the other, *Conqueror*, was pure white, the centre rosy purple, the base of the petals round the centre being suffused with the same; they were masses of bloom, and highly attractive. Mr. Wills, gardener, Huntroyde Park, exhibited a group of gold and bronze zonale *Pelargoniums*, on which the popular interest centred. Some of these were very fine plants, of vigorous and yet compact habit, the leaf-marking enduring well as the leaves increase with age. The two darkest-zoned kinds in the group were *Model*, which opens a pale green-leaf ground, changing to gold with age, having a dark-chestnut zone and narrow margin of golden green, a large plant and very showy; and *Beauty of Calderdale*, bright reddish broad chestnut zone on a golden-leaf ground, and having a broader-leaved margin than the foregoing, very fine and effective. Some good forms of the common *Foxglove* were shown by Messrs. Ivery & Son, of Dorking. The two ground-colours, purple and white, are still retained, the variation occurring in the marking found on the interior of the tube; some of the white flowers were heavily and handsomely spotted with rosy crimson, and would make very showy plants for shrubbery borders. Mr. Fraser, Lea Bridge Road, contributed *Gloxinia Rose d'Amour*, a large and bold flower of the drooping section, with pure white throat and edged with bright rose, the colour being brighter and

deeper on the lower part of the flower; and Messrs. Veitch & Sons sent *Gloxinia Madame de Smet*, a very showy flower with a waxy-white tube and violet-purple lobes; and *Vlaanderen*, rich rosy purple, the lobes slightly edged with violet, a fine hue of colour, and a good flower. Mr. Richards, gardener to Lord Londesborough, Grimston Park, Tadcaster, had a very fine specimen of the variety of *Vanda teres* called *Andersoni*, which was growing on a block in a pot, and bore 11 flowering spikes. G. F. Wilson, Esq., Weybridge, exhibited a magnificent specimen of *Lilium longiflorum*, with nine pure white blooms, each about 7 inches in length and about 5½ inches in diameter at the mouth.

July 15-19.—The Society's first Great County Show was held at Bury St. Edmund's, and was of a most gratifying character, having been really good throughout.

Of the prizes for Stove and Greenhouse Plants, the Society's 20-guinea Cup was won by Messrs. Lee, of Hammersmith, with a very fine lot of plants, among which occurred *Allamanda Hendersoni*, beautifully bloomed; *Erica Permentieri rosea*, quite smothered in its lovely blossoms of a delicate roseate hue; *Ixora javanica*, full of bloom and brilliantly coloured, and a splendid bush of *Kalosanthes coccinea*. Scarcely, if at all, inferior was the collection of Mr. Baines, gardener to H. L. Nichols, Esq., Bowdon, near Manchester, in which were two such plants of *Sarracenia* as were never before seen—one, *S. purpurea*, a dense mass 3 feet over, and with enormous pitchers, and the other, *S. flava*, fully a yard high, with the mouth of the pitchers 3¼ inches across, and the broad leafy lid 4½ inches. Mr. Baines had also a splendid plant of *Anæctochilus Lowii*, and a remarkably fine mass of *Dionæa muscipula*. Fine-foliage plants were numerous and effective, but very few Orchids were shown. Palms and Ferns, the latter especially, formed considerable features. A beautiful group of *Sarracenias*, in addition to those shown in his large collection, came from Mr. Baines, of Bowdon. They consisted of *S. Drummondii alba*, nearly 5 feet high, with the lid of the pitcher mottled with white and wavy at the margin; two plants of *S. flava*, 4 feet high, with the lid ovate and plane; *S. rubra*, 1½ foot high, with a red-veined ovate plane lid; *S. variolaris*, with the upper part of the tube mottled with white and the head recurved like a parrot's bill; and *S. purpurea*, very highly coloured. They formed a group such as is rarely seen at exhibitions.

A very interesting feature of the exhibition was presented by

a class for Bedding Plants shown in honour of the late Donald Beaton, in which there were several competitors. The Cup offered for this (Suffolk Gardeners' Cup) was taken by Mr. Grieve, who showed forty-eight groups of well-grown plants, each kind occupying a small square box, of about 12 inches by 12. Another good feature was presented in the class for cut flowers of twenty-four Hardy Herbaceous Plants, which, when shown in good-sized neat bunches, as were those of the 1st prize lot for Mr. Gilbert, St. Margaret's Nursery, Ipswich, are really effective.

An interesting group of New Plants was shown by Messrs. Veitch & Sons, of Chelsea, but they consisted entirely of subjects which are already familiar at London exhibitions. The show of Cut Roses was very good, and there was a sharp competition for the Silver Cup given by the Suffolk gardeners for the best twelve Cut Roses shown by a Suffolk amateur. This was won by Mr. W. Nichol, gardener to J. H. Powell, Esq., Drinkstone Park, Bury St. Edmunds, who had excellent blooms of Madame C. Crapelet, John Hopper, La Ville de St. Denis, Jean Gougou, Charles Lefebvre, Maréchal Vaillant, Duc de Rohan, Princess of Wales. Sénateur de Vaisse, Lord Macaulay, Maréchal Niel, and Cloth of Gold.

The Town of Bury Silver Cup for the best nine Fuchsias was awarded to Mr. D. T. Fish, who had some splendid plants, averaging from 7 to 8 feet in height, well grown and bloomed; and the Rev. F. Cheere's Prize for twelve Pelargoniums, Show or French, was taken by Mr. D. T. Fish, with some large and finely-grown plants, having some good heads of bloom. In the Class for twelve Scarlet Pelargoniums, distinct kinds, the Rev. F. Cheere was 1st with some excellent plants, well grown and flowered, and in no way disfigured by being tied out of shape. The sorts were Culford Rose, Clipper, Rose Rendatler, Sir William Wallace, Madame Leomine, Roi d'Italie, Rose Perfection, Dr. Lindley, Virgo Maria, Dr. Newnham, Madame Rüdersdorff, and Robert Fish.

Mr. Grieve was the winner of the County Cup for twelve seedling Variegated Pelargoniums of 1866-1867, all yearlings, some of which were only just breaking into character. The sorts were Fanny Newnham, Bride of Dandelot, Victor Galbraith, Lizzie Paget, Black Adder, Hiawatha, Isabella Clay, Clemmy, Eva Fish, Rothley, Allanton, and Victoria Regina.

There was a very good display of fruit, of good quality. The 1st prize for Pine-Apples was taken by Mr. Ward, gardener to F.

N. Miller, Esq., Bishop's Stortford, who had a handsome Queen, weighing 5lb. 6 oz. Some plants of Thoresby Queen, stocky and well grown, with large but unripe lumpy fruit unequally swelled, which seemed characteristic of the variety, came from Mr. A. Henderson, gardener to Earl Manvers, Thoresby Park, Ollerton.

Grapes formed an excellent exhibition. For black sorts, Mr. Squibs, Ickworth Park, was first with moderate-sized bunches, remarkable for their fine berries and dense black colour. Mr. Standish, Ascot, received a well-merited First-Class Certificate for nicely ripened samples of his new Grape, Royal Ascot, which deserves all that has been said in commendation of it. The finest sample of Grapes, however, consisted of three bunches of Hamburgs, shown for the Stowmarket Medal by Mr. Meads, gardener to Raikes Currie, Esq., Minley Manor, Farnborough, Hants. These were large, irregular clusters of fine berries, pretty well coloured, and weighed together 26½ lb.

The Cup offered by the 'Gardeners' Chronicle' for a collection of fruit and vegetables was awarded to Mr. Pottle, gardener to B. D. Colvin, Esq.; and the prizes offered by the 'Journal of Horticulture' for two desserts, were taken by Mr. Carmichael, gardener to H.R.H. the Prince of Wales, Sandringham, and Mr. Blair, gardener to Sir G. N. Middleton, Bart., Shrubland Park.

The show of Implements was not extensive; but some very good articles were produced in several of the classes, especially among garden-seats, engines, suction-pumps, lawn-mowers, and models of greenhouses.

August 6.—Mr. Shaw, of Manchester, and Mr. Williams, of Holloway, each exhibited some very curious dwarf varieties of *Athyrium Filix-femina*, raised by Mr. Glover; they were severally named, *Gloveri*, *Glomeratum ramosum*, *Frizelliæ ramosum*, and *Frizelliæ cristatum*. Messrs. Jackman & Son, of Woking, contributed a boxful of magnificent blooms of *Clematis*, including the following new kinds:—*Lady Bovill*, lavender; *Mrs. Bateman*, violet, a variety which in general produces blossoms having six petals instead of four or five; and *Thomas Moore*, a fine kind, having reddish-purple blossoms shaded with violet and white stamens. *C. lanuginosa candida*, in the same collection, found to be a fine white sort, which, when intermixed with the charming varieties just named and others of the Woking hybrids, must produce a striking and beautiful effect. G. F. Wilson, Esq., furnished a beautiful Japanese Lily, *Lilium Thunbergianum*

aureum nigro-maculatum, bearing large erect flowers of a bright orange-red colour thickly ornamented with dark mulberry-coloured spots ; it is a most profuse flowerer, and possibly hardy. Mr. Green, gardener to W. Wilson Saunders, Esq., brought an interesting group of plants, among which occurred the slender-growing African *Pelargonium alchemilloides*, with small roundish pale-green leaves, on which is stamped a well-defined deep-brown-coloured horse-shoe. Messrs. Lee sent the prettily cut-leaved *Rhus glabra laciniata*, a handsome form of this useful species. Mr. C. J. Perry, of Birmingham, contributed a stand of splendid new *Verbenas* among which were *Miss Turner*, white, with rosy-lilac centre, a beautiful and pleasing flower, of great substance, circular, and smooth, and a splendid exhibition variety ; *G. P. Tye*, one of the finest-formed flowers yet produced, the colour blush suffused with pink, with a violet-rose centre ; *Hercules*, violet-rose, richly shaded, and having a striking crimson centre round a white eye, very fine quality ; and *Thomas Harris*, a rich plum-colour, shaded with a glossy darker hue, and having a pure-white centre. Messrs. E. G. Henderson & Son exhibited *Fuchsia Golden Fleece*, which looked as if it would make an effective bedding variety, being dwarf and of a close bushy habit, and at the Wellington Road Nursery makes a very beautiful display. They also sent *Pink Napoleon III.*, an improved form of the rose-coloured *Dianthus hybridus multiflorus*, the flowers of which are bright crimson-scarlet. Mr. G. Smith, Islington, produced two splendid hybrid Nosegay Pelargoniums, viz. *Éclat*, a rich shade of magenta, suffused with purple, the flowers of extra fine quality, the trusses of an enormous size, freely developed, and the foliage slightly zonate, a great acquisition ; and *Grand Duke*, colour brilliant orange-scarlet, a very showy and effective variety, with the foliage also slightly zonate. Messrs. Downie, Laird, & Laing, had a golden-foliaged Pelargonium named *Countess of Kellie*, having a distinct chestnut zone ; its habit is vigorous and yet close, and it promises to make a very effective and durable bedder.

August 20.—In an interesting collection of plants from Mr. Bull were produced *Calamus javanicus* and *C. adspersus*, two small-growing elegant pinnate-leaved species of Palms, well adapted for decorative purposes. Messrs. E. G. Henderson & Son had a variety of *Ixora crocata*, called *rutilans*, which was deeper in colour and better habited than the older kind. Mr. Parsons, gardener to W. Blake, Esq., Danesbury, showed an interesting variety

of Lady-Fern, called *Athyrium Filix-femina ceratophyllum*, which has the fronds finely cut. A boxful of blooms of *Maréchal Niel Rose* was shown in admirable condition by Mr. Keynes, of Salisbury. The most interesting feature, however, of this Meeting was formed by some seedling *Hollyhocks*, from the Rev. E. Hawke and Mr. Chater, of Saffron Walden, the latter contributing a fine lot of spikes as well as cut blooms. Mr. Hawke's flowers were *Ruby Queen*, brilliant ruby-red, large and full; and *Gem*, deep salmon-rose, large, and of full substance, both remarkably fine. Mr. Chater's varieties were:—*Alba superba*, pure white, large, and full; *Walden Queen*, pinkish salmon, the flowers somewhat small and loosely set on the spike; *Whitley King*, not so good as Hawke's *Gem*; *Queen of Yellows*, a very good shade of colour, but wanting colour in the guard petal, which was also too large; and *Moonlight*, a glossy, dark kind, wanting quality. Among seedling Dahlias, Mr. Keynes showed *Mrs. Dodds*, white ground, tipped with lilac, the centre deeper in colour, good form and outline, and high close centre; and *Caroline Tetterell*, something like the foregoing in character, the lilac being, however, of a deeper hue and distributed more over the ground, good form, and high close centre. Mr. Standish, Ascot, brought a free-blooming perpetual Picotee, *Ascot Yellow*, bright-yellow ground, edged with rosy red, the habit excellent, a capital variety for cut flowers. Mr. Eckford, Coleshill, showed a Verbena, *The Cure*, rose suffused with purple, having a well-defined centre of bright crimson; pips stout and large, and very attractive.

September 3.—Foremost among the subjects exhibited at this meeting were seedling Dahlias. The most remarkable were the following:—From Mr. Turner, *Yellow Perfection*, a good stride in the improvement of the yellow flowers, the colour rich golden yellow, of a beautiful hue, centre close and high, good outline, plenty of substance, and said to be very constant. From Mr. Rawlings, of Rumford, *Hebe*, a light-ground flower, very regularly and evenly tipped with rosy lilac, deepening to purple, the blooms of medium size, centre close and high, good outline, and fine form of petal. From Mr. Keynes, *Sir Greville Smythe*, a bright orange-red, the centre suffused with purple, a flower of good properties, but not perfect in form, the centre petals being too upright: *Lady Derby*, a very pleasing popular flower, though not perfectly first-class from the florist's strict point of view; the colour pale ground, heavily tipped with bright rosy purple; good

petal and outline: *Viceroy of Egypt*, a somewhat large and flat flower, yet of good qualities as a fancy kind, the ground-colour suffused rosy-lilac, with crimson stripes; a fine exhibition variety: *Leopardess*, a large and bold fancy flower, of the same build as the previous one; the ground-colour lilac, spotted and striped with bright crimson, the petals of fine form; a bold and showy flower. The foregoing were the very cream of the new flowers shown on this occasion. Messrs. Veitch & Sons exhibited the new and rare *Aerides Huttoni* (since called *Saccolabium Huttoni*), from Java, with rosy-violet flowers, standing erect on a pendent stalk, a small plant, but of free-blooming properties. Mr. W. Paul, Waltham Cross, showed a golden-foliaged *Euonymus*, named *flavescens*, having four shoots, some 3 or 4 inches of each of which was of a clear golden hue, the other leaves mottled with green and gold. It was considered a great acquisition if it could be perpetuated.

September 17.—The show of Variegated Zonale Pelargoniums held on this occasion was a most excellent one, and both exhibitors and visitors appeared to take a lively interest therein. We can only here notice the best novelties. Among Golden Variegated Zonales, the *Countess of Craven*, from Messrs. Perkins, of Coventry, stood first; it has medium-sized leaves, with a fine golden edge and a red and mulberry zone. Messrs. F. & A. Smith's *Jetty Lacy*, a handsome variety, came second; and Mr. Watson's *Mrs. Dix* third. Certificates were given to Messrs. Saltmarsh for *Crown Jewel*; to Messrs. E. G. Henderson for *Beauty of Culford*, a very fine kind, with a broad bright zone having an unusual amount of red in it; and to Messrs. F. & A. Smith for *Retaliator*. In the Class for the best Gold-and-Bronze Zonale variety, Messrs. Carter & Co. were first, with *Egyptian Queen*, which has a broad reddish-bronze zone with a golden centre and edge, altogether very beautiful. Messrs. Downie, Laird, & Laing were second, with *Countess of Kellie*, a sort having a handsome light-coloured zone and a bright golden ground. Messrs. Carter were third with *Cleopatra*, which is something like *Egyptian Queen*. Mr. Uphill, Moreton, Dorchester, received a Certificate for *Mrs. Frampton*. In the Class for the best Golden Self, Mr. Tirebuck, of Luton, was first, with *Golden Drop*; Messrs. Saltmarsh second, with *Golden Queen*; and Mr. Tirebuck third, with a variety which was also shown under the name of *Golden Queen*. In the Class for the best Silver Varie-

gated Zonale, the first prize was awarded to Messrs. F. & A. Smith for *Miss Burdett Coutts*, a variety having a large bold leaf with a broad edge and zone, the latter with much pink in it; Messrs. E. G. Henderson were second, with *Italian Sunshine*, having similar leaves, less red; and F. & A. Smith third, with *Peri*, white edge and a broad green centre. Messrs. Veitch & Sons exhibited some very beautiful plants, including *Alocasia Jenningsii*, with black foliage edged and banded with green. Mr. Bull contributed also a highly interesting collection, among them *Oreodoxa regia*, an elegant Palm, *Cyathea canaliculata*, a handsome tree Fern, and *Araucaria elegans*, an elegant species, of smaller growth than *A. Rulei*. Mr. W. Paul exhibited *Cupressus Lawsoniana ochroleuca*, a handsomely variegated sort, with the young spray blotched with creamy white. A few Dahlias were shown: *Buttercup*, from Mr. Turner, and *Golden King*, from Mr. G. Rawlings, are two fine high-coloured yellow flowers, something similar in build, though distinct in colour; the latter were smaller than Mr. Turner's flowers, though equally pure in colour, and of as fine a petal and outline. *Rosamond*, also from Mr. Turner, has grown into a fine flower, the colour a clear pinkish lilac, very bright and pleasing; it will render good service as an exhibition variety. *Memorandum*, from Mr. Church, is a light-ground flower, tipped with rosy lilac, very pretty, of good substance, and smooth in the florets; and *President*, from Mr. Legge, of Edmonton, is a fine addition to the lively crimson flowers, of a very rich hue of colour, with a remarkably full and high centre, good petal and substance, and possesses first-class properties.

October 1.—From the Society's Garden came a collection of beautifully flowered small plants of *Odontoglossum grande*. Among them were one or two large-blossomed and highly coloured varieties. It may be mentioned that this *Odontoglossum* is pre-eminently a cool Orchid, and that, as such, it is well worth the attention of amateur cultivators. *Dendrobium cumulatum* was furnished on this occasion by Messrs. Veitch; it produces drooping spikes of white flowers, flushed with lilac, and when better established will probably be a showy and interesting species. Mr. Bull contributed a fine group of plants, in which were *Ptychosperma regale*, a handsome Palm, with leaves which, when young, have a coppery tinge on the upper surface, and are ribbed with red on the lower side; and *Aspidistra elatior angustifolia*

variegata, with narrow leaves striped with cream-colour. Messrs. Carter & Co. had three good plants of *Phalenopsis amabilis* in fine bloom. Mr. Stevens, of Ealing, showed *Variegated Zonale Pelargonium Achievement*, a kind with smooth leaves, having a broad bright crimson and black zone on a yellow ground. Mr. Cripps, Tunbridge Wells, sent a beautiful collection of cut blooms of Clematises, including *Star of India*, violet purple, striped with rosy purple; *Marie Lefebvre*, very large, delicate French white, striped with deep lilac; *Madame Van Houtte*, very large, pure white; and *Sensation*, also large, pale blue. Mr. Cripps likewise exhibited *Cupressus Lawsoniana flava*, a variety with a golden tinge on the young growth. Mr. Standish, Royal Nurseries, Ascot, sent a collection of seedling Gladioli, which included the following novelties:—*William Menzies*, rosy carmine, with faint flakes of white, the throat pencilled with purplish crimson, and forming a close and effective spike, having sixteen expanded flowers at one time; *Lady Alice Hill*, a novel-looking flower, having a pale ground marked and feathered with bright deep lilac, the throat stained with rosy violet; and *Lord Kentis*, bright orange-red, with conspicuous lemon throat, and a light stripe up each segment of the flower, a fine and attractive exhibition variety. Messrs. E. G. Henderson & Son exhibited some finely flowered Standard Veronicas, among which *V. purpurea violacea* was conspicuous, being apparently a robust free-growing kind, with strong spikes of flowers of a beautiful violet-purple colour. The other Veronicas exhibited were *Madame Bouchardat*, *Azurea superba*, *Delfossiana*, and *Meldensis*. Messrs. Henderson also had a collection of Lantanas, of which *Ne plus ultra*, *Alba lutea grandiflora*, *Julius Cæsar*, and *Madame Dufoy* were the best.

October 15.—Mr. Bull contributed on this occasion an interesting collection of plants, among which were *Encephalartos gracilis*, a graceful-looking species, with long, slender, downy stems, on which the narrow leaves are arranged in a somewhat pectinate form; *Aucuba japonica mascula marmorata*, a mottled variety, bearing considerable resemblance to the ordinary *Aucuba*, but having the colours more intense and therefore better contrasted; *A. japonica femina grandis*, a noble species, with large, broad, green, glossy foliage. Mr. Bowie, gardener, Chillingham Castle, sent a new *Lobelia*, named *Little Gem*, a compact-growing kind, with white blossoms broadly edged with blue, which was much admired.

November 5.—Messrs. Veitch & Sons exhibited a charming collection of flowering plants, consisting chiefly of Orchids, among which were the beautiful *Vanda cœrulea*, *Cattleya maxima*, as well as some unusually beautiful varieties, the ever-flowering *Lycaste Skinneri*, *Dendrobium bigibbum*, and *Lælia præstans*; *Dracæna Macleayii*, a beautiful plant with deep greenish-olivaceous or bronzy-silvery leaves, and *Aphelandra Roezlii*, a showy species with brilliant orange-scarlet blossoms and broad silvery foliage, with a twisted petiole. Messrs. F. & A. Smith produced a deep crimson-scarlet *Tropæolum*, called *Mrs. Treadwell*.

December 3.—One of the most interesting features of this meeting was a collection of Japanese Chrysanthemums, from Mr. Salter, of Hammersmith: *Red Dragon*, *Aurantium*, *Comet*, and *Wizard*, were especially and deservedly admired. Of these the first has thread-like petals of a warm red colour, tinged with gold; the second, on the contrary, is remarkable for the breadth of its massive yellow petals; while in *Comet*, again, occurs the thread-like form, fringed with reddish brown; and *Wizard* is a dark crimson, with a small yellow eye. *Tarantula*, a yellow sort, also deserves notice, on account of its hard button-like centre, and long, narrow, sprawling florets which surround it. These varieties, though so different in colour, are said to have been all raised from *Chrysanthemum roseum punctatum*; and from them others possessing more merit may doubtless soon be expected to be obtained. They cannot be called florist's flowers, but for ordinary conservatory decoration they will be found invaluable. Mr. Green, gardener to W. Wilson Saunders, Esq., brought a charmingly rose-spotted variety of *Odontoglossum Alexandræ*, called *Bowmanii*; it was the finest variety which has yet been shown. Messrs. E. G. Henderson sent blooms of a finely formed white sport from the Princess of Wales Chrysanthemum, named *Beauty of St. John's Wood*. From the same firm, as well as from Mr. Forsyth and Mr. George, came a collection of cut blooms of Chrysanthemums.

The Floral Committee, at a Meeting held at Chiswick on the 19th of August, awarded Certificates to the following varieties of bedding Pelargoniums, these being either absolute novelties or sorts which had not previously been tried out of doors at Chiswick :—

FIRST-CLASS CERTIFICATES.

Madame Martha Vincent, free blooming good white, the white a little tinted and the flowers in good trusses.

Purity, free and bearing good trusses, the flowers pure white. This and the foregoing are the two best of the many white-flowered sorts in the collection, the first having slightly the advantage in freeness and size of truss, and the latter in pureness of colour.

Madame Werle, free blooming, fine shape, white, with delicately tinted rosy-pink eye; leaf zoned.

Fairy Queen, a free and useful sort, with bright rosy-crimson flowers and lobed leaves.

Dr. Hogg, very showy, a seminosegay with large broad petals of a rosy-crimson hue, the lower petals, especially in some stages, being more strongly suffused with rose.

Rebecca, a seminosegay, with zoned leaves and fine trusses of large rosy-red flowers, having glowing upper petals.

Crystal Palace Gem, a large, red, and very showy flower with small white eye, something in the way of *Roi d'Italie*, and with dark-zoned leaves.

Warrior, a strong growing sort, with plain green leaves and large trusses of finely shaped bright scarlet flowers.

Sambo, dwarf compact habit and faintly zoned leaves; the flowers rather small but of a very rich crimson-scarlet.

Lady Constance Grosvenor, a very effective flower, and probably the best, as far as yet developed, of the present season; the leaves are of a peculiarly lively green and elegantly marked with a dark zone, and the flowers (of the Nosegay class) are of a very bright scarlet and produced in large trusses: it is a decided beat upon *Cybister*.

Violet Hill Nosegay, which had formerly been voted a Second-class Certificate, was now given a First; it is remarkably dwarf and compact, with a full head of salmon-red flowers, and has lobed leaves; and if a continuous bloomer, will make a pretty edging variety.

Gloire de Nancy, with large plain green leaves and rose-tinted flowers, was selected for reward as the best of the double-flowered varieties yet obtainable.

Princess Alexandra, a silver-variegated sort, of compact growth, with large flat leaves, broadly edged with white.

Castlemilk, a white-edged variety, of rather erect free growth, with the leaves inclined to cup.

Snowdrop, the counterpart of *Princess Alexandra* as to compactness and flatness of leaf, but with the broad margin of a creamy tint.

SECOND-CLASS CERTIFICATES.

Albion's Cliffs, a silver-edged, much in the way of *Castlemilk*, but more vigorous in growth, and somewhat less white in appearance; a good useful sort, nevertheless.

Oberon Nosegay, with yellowish-green leaves, marked by a dull zone, and large scarlet seminosegay flowers; it is bright in colour, but thin.

Emily Morland, a zonate scarlet.

Vulcan, a free-growing sort, with green-lobed leaves and seminosegay flowers of a clear scarlet.

In addition to the foregoing, First-class Certificates were given to the *Golden-leaved Pyrethrum Golden Feather*, from Messrs. E. G. Henderson & Son, and to *Tropæolum Advancer*, a dwarf, compact-growing, orange-scarlet, from Mr. Chater; and at a subsequent meeting, a First-class Certificate to *Lobelia Little Gem*, a dwarf bedding kind, with white eye, from Mr. Bowie, of Chillingham.

Report of Meetings of Fruit and Vegetable Committee.—January 15, 1867.—Messrs. Lucombe, Pince, and Co., of the Exeter Nursery, exhibited a bunch of *Mrs. Pince's Black Muscat Grape*, to show how well it maintained its flavour and keeping-qualities. It was a little shrivelled, but still of excellent flavour, which was slightly musky. The Committee considered it a most excellent late Grape, and confirmed the judgment given upon it at a previous meeting, when it was awarded a First-Class Certificate.

Mr. J. B. Whiting, The Deepdene, Dorking, received a Special Certificate for a very handsome collection of eight sorts of *Apples* in excellent preservation; amongst them *Sudbury Beauty*

was found exceedingly sweet and good; likewise Boston Russet and Mickleham Pearmain, which last is very tender-fleshed and rich.

Henry Wentworth, Buller, Esq., exhibited a dish of *Apples* unnamed. It was a small round sort, apparently a good keeper; but the Committee considered it too small for kitchen use, and not rich enough for dessert.

Mr. John Marshall, Riseholme, Lincoln, and Messrs. J. Slater & Sons, The Nurseries, Malton, likewise exhibited *Apples*.

February 19, 1867.—Thomas Laxton, Esq., Stamford, exhibited two sorts of *Apples*, viz. Stamford Pippin and Welland Pippin. The Stamford Pippin was sent, Mr. Laxton stated, merely to show that its keeping-qualities and flavour would bear comparison with the best apples then in season. The Welland Pippin is a seedling, the parentage of which is unknown. The fruits sent, Mr. Laxton stated, were from the original tree, and the past was the third year of its fruiting: the tree, which is healthy, is a good bearer; it is growing there in a town garden, on the Lower Oolite soil, shallow, and nearly artificial. The fruit ripens rather late, but always thoroughly. It is roundish in form, about the size of Dumelow's Seedling, and has, like it, a translucence round the eye; skin smooth, yellowish, tinged faintly with red next the sun, and streaked; the flesh soft, somewhat mealy; the flavour is pleasant, but not sufficiently rich to merit distinction as a first-rate dessert fruit, but being extremely handsome, Mr. Laxton was requested to send it again.

Mr. J. B. Whiting exhibited a collection of *Apples*, among which the Blenheim Orange was remarkably handsome and of excellent quality. Adams's Pearmain was also unusually fine. A Special Certificate was awarded.

Mr. Parsons, gardener, Danesbury, Welwyn, Herts, exhibited a collection of nineteen sorts of *Apples* in excellent condition. Among these the Blenheim Orange was remarkably fine and highly coloured. A Special Certificate was awarded.

Mr. Earley, gardener to F. Pryor, Esq., Digswell, Welwyn, Herts, exhibited several varieties of *Apples*, among which Dredge's Fame was conspicuous. It is a medium-sized kitchen Apple, the flesh greenish-white, with a brisk acidity, excellent for cooking.

Mr. Earley likewise exhibited a large collection of *Potatoes* of good appearance, also a punnet of *Mushrooms*. Amongst the

latter, which sprung from spawn purchased for that of the common Mushroom (*Agaricus campestris*), was a variety of which a section of the stalk exhibited a yellow tinge, very different from the true Mushroom. Mr. Berkeley, who examined them, decided that it was *Agaricus arvensis*, a very inferior variety.

Mr. Sherrat, gardener to James Bateman, Esq., Knypersley Hall, Congleton, exhibited fruit of the *Citrus Japonica* (the *Kumquat*, or *Cumquat*, of the Chinese) from a tree grown in a warm greenhouse. The fruit was like a small oval yellow Plum. Specimens of the preserved fruit, as sold by the confectioners, were also exhibited. Mr. Fortune stated that the *Citrus Japonica* was largely cultivated in China and Japan, and that it was hardier than the common orange, and would probably prove sufficiently hardy to succeed out of doors in the warmer parts of the south of England. The bushes, 3 to 4 feet in height (in China), are very beautiful in November and December, when loaded with ripe fruit. It must be grafted on *Limonia trifoliata*.

Mr. B. Dean, Ealing, exhibited examples of *Fearnought Cabbages*, a hybrid between the Dwarf Cabbage and Hearting Kall. It resembles an open-hearted Cabbage, the outside leaves green tinged with brown, the heart white, as if blanched. It was stated to be very hardy, tender, and good.

March 5.—Mr. J. B. Whiting was awarded the First Prize for the best three dishes of *Dessert Apples*, and also for the best three dishes of *Kitchen Apples*.

Mr. Sherrat, gardener to J. Bateman, Esq., exhibited a bunch of the *Ahbee Grape*. It is a variety much admired for the beautiful rosy-blush which it acquires when well ripened. It is in flavour, however, very inferior. It was originally sent by Col. Sykes to the Society from the Deccan, India.

Mr. Stanton, gardener to James Bateman, Esq., Biddulph Grange, exhibited very fine examples of home-grown *Oranges* and *Lemons*.

Mr. Lee, Cliveden, Bristol, exhibited two very distinct-looking *Apples*, both grown on the same tree; one was the true Orange Pearmain, smooth, glossy, streaked with bright red on a pale orange ground; the other was completely russeted.

March 19.—Messrs. Cutbush & Sons exhibited some fine examples of an *Onion*, called Nuneham Park, which the Committee decided was not distinct, but simply a well-selected stock of the White Spanish.

Mr. Holliday, gardener to H. B. Walmsley, Esq., Acton, exhibited a remarkably handsome and beautiful fruit of the *Ripley Queen Pine-Apple*, to which a Special Certificate was awarded.

Mr. Johnson, gardener to the Marquis of Aylesbury, Savernake, exhibited *Lady Downe's Seedling Grape*, in good condition. These were sent by Mr. Johnson merely to show the Committee what an excellent keeping variety it is.

Mr. B. Holliday, wireworker, 2A Portobello Terrace, Notting Hill Gate, exhibited a piece of wirework, called Paxton's "Strawberry Crinoline," described as follows in a note which accompanied it:—"The Strawberry Crinoline is a circular piece of wirework in two halves, galvanized; it supports the berries 4 inches from the ground, preserving them from contact with the earth, slugs, &c. They will last at least ten years with care." The Committee thought they would prove rather expensive for general use, but suggested that they might be desirable for small growers.

April 2.—Mr. George Curd, gardener to M. G. Thoyts, Esq., Sulhamstead, Reading, was awarded a First Prize for the best three dishes of *Dessert Apples*.

Mr. John Cox, of Redleaf, and Mr. W. Lynn, gardener to Lord Boston, Hedsor, Maidenhead, were placed equal second for the same. The varieties exhibited included Royal Pearmain, Old Nonpareil, Scarlet Nonpareil, Besspool, Ribston Pippin, &c.

For the best two dishes of *Kitchen Apples* Mr. J. Cox was awarded the First Prize. Sorts, Royal Russet, Norfolk Beefing, Bedfordshire Foundling. The second was awarded to Mr. Earley for Dredge's Fame, Norfolk Beefing, Bedfordshire Foundling.

Mr. Middleton, gardener to Sir W. W. Wynne, Wynnstay Hall, Ruabon, exhibited a collection of thirty varieties of *Apples*, for which a Special Certificate was awarded.

Mr. Carmichael, gardener to His Royal Highness the Prince of Wales, at Sandringham, exhibited a very nice dish of "*Little Gem*" *Peas*, which had been grown in pots under glass, showing what an excellent variety it is for that purpose where space can be afforded. Mr. Carmichael mentioned, in the letter accompanying them, that he made the first sowing (in 8-inch pots, eight or ten peas in a pot) in the middle of September, from which he gathered on the 9th of December. They continued bearing till the end of February. He made a second sowing in the middle of

November, from which he gathered, first, on the 9th of March, and, secondly, the dish exhibited before the meeting. A Special Certificate awarded.

April 16.—Mr. Lydiard, of Batheaston, Bath, exhibited a very good dish of *Princess Alice Maude Strawberries*, several sorts of *Cucumbers*, and a *Seedling Potato*, in appearance like the Ashleaf, which was considered very good for the season of the year. Special Certificate awarded.

Mr. Wm. Melville, gardener to the Earl of Roseberry, Dalmeny Park, Edinburgh, exhibited some heads of "*Melville's Imperial Early Cauliflower Brocoli*." Mr. Melville stated that it had stood uninjured by the frost during the late severe winter. It was commended by the Committee as a very good late protecting variety, allied to Knight's Protecting, but dwarfer. The Committee were, however, of opinion, that the designation of "Early Cauliflower" was misapplied in this instance, it being now *late* in the Brocoli season.

May 7.—Mr. Gardiner, gardener to Sir George Phillips, Weston House, Warwickshire, exhibited two dishes of *Bellegarde Peaches*. They were very fine and quite ripe. Special Certificate awarded.

Mr. Fairbairn, gardener to His Grace the Duke of Northumberland, Syon, exhibited several pots of *Keen's Seedling Strawberries*, excellent examples of good pot cultivation. It was remarked that this variety, although one of the best for forcing generally, does not bear carriage well, being somewhat tender-fleshed. Special Certificate awarded.

Mr. Merret, gardener to Henry Whiting, Esq., Battersea Rise, exhibited excellent examples of *Sir Charles Napier Strawberry*; those in pots showed very good cultivation, the crop abundant, berries of fair size and finely coloured. Special Certificate awarded.

Mr. Earley, gardener to F. Pryor, Esq., Digswell, Welwyn, Herts, exhibited six heads of *Williams's Alexandra Brocoli*. They were large, forming a close, white head, which was protected by the leaves, the stalks of which were stout and curved inwards, like Knight's Protecting. Mr. Earley stated that it was a very hardy variety. The Committee considered it an exceedingly good late Brocoli, and worthy of all commendation. First-Class Certificate awarded.

Mr. Turner, Slough, exhibited three bunches of *White Muscat of Alexandria Grapes* and three bunches of *Black Hamburg*.

Both of these exhibitions were remarkably fine and beautiful, and to each a Special Certificate was awarded, the Committee regretting that it was not in their power to bestow a higher award for such beautiful grapes at this early season.

May 21.—At this meeting, for the best three dishes of *Dessert Apples*, Mr. J. B. Whiting, The Deepdene, was awarded the First Prize, for Adams's Pearmain, Mickleham Pearmain, and a sort unnamed. The Second Prize being awarded to Mr. Lynn, gardener to Lord Boston.

For the best three dishes of *Strawberries*, Mr. Curd, gardener to M. G. Thoyts, Esq., was awarded the First Prize, the sorts being Eclipse, Sir Harry, and Marguerite.

For the best dish of *Cherries*, the First Prize was awarded to Mr. Lynn for Frogmore Early.

For the best dish of *Peaches*, the First Prize was awarded to Mr. Tegg, gardener to his Grace the Duke of Newcastle, Clumber, for Bellegarde.

Mr. Cox, of Redleaf, exhibited a collection of six sorts of well-preserved *Kitchen Apples*, to which a Special Certificate was awarded.

Mr. Pearson, Chilwell, exhibited some *Walnuts* of the growth of 1864 (2½ years old), in very excellent condition. They had been kept by Mrs. Hetley, of Orton Longueville, Peterborough, who allows them to fall naturally from the tree, dries them well in the open air, then keeps them in bags in a dry attic. A Special Certificate was awarded.

Mr. Shortt, gardener to Viscount Eversley, Heckfield, exhibited fruit of *Cerasus Pseudo-cerasus*. It is a small species of cherry, of a pale amber-colour, almost transparent, with a hooked point at the apex. It is pretty, but not fit for dessert, being mawkishly acid. It might, however, make a tolerable preserve.

June 4.—Mr. Rivers, of Sawbridgeworth, exhibited ripe fruit of seven varieties of *Cherries*, grown in an orchard-house in pots. They proved a very interesting exhibition, and consisted of the following, viz.:—1. Guigne Native de Lyons, bright mottled red; 2. Guigne très-précoce, dark red; 3. Noire précoce de Strasse, small black; 4. Early Purple Guigne, considered the best; 5. Early Strasse, or Bigarreau de Strasse, like a small White Heart; 6. Belle d'Orléans, large, pale; 7. Guigne Marbrée, small, dark maroon. Special Certificate awarded.

June 18.—Mr. Tillery, gardener to His Grace the Duke of

Portland, Welbeck, exhibited three dishes of *Strawberries*, viz. :—Ingram's Prince of Wales, Reeves's Eclipse, and Empress Eugénie. Special Certificate awarded.

Messrs. Lee exhibited fruit of "*The Lady*" *Strawberry*, also several plants, in pots, laden with fruit. It is a very productive variety; berries large, pale, nearly white. It was found very deficient in flavour.

Mr. Shortt, gardener to Viscount Eversley, Heckfield, exhibited a fruit of *Passiflora macrocarpa*, which proved the same as *P. quadrangularis*. Mr. Shortt also exhibited a fruit of *Golden Eversley Melon*, a variety of inferior flavour.

From the Garden of the Society, Chiswick, came a collection of thirty-three sorts of *Strawberries*, many of which were very large and fine, particularly Sir Joseph Paxton, Dr. Hogg, Sir Harry, Premier President, No. 3 Nicholson, Seedling H. Nicholson (very large), Napoléon III., Ambrosia, Prince Imperial, Vicomtesse Hericart de Thurg, &c. &c.

July 2.—Mr. Dancer, Little Sutton, Chiswick, exhibited several branches of *Red and White Dutch Currants*; they were very heavily laden with splendid bunches of unusually large and fine fruit. Mr. Dancer stated that he had several distinct varieties growing in his grounds. The currant-crop being a very important one, and much confusion existing as to the respective varieties with their names, the Committee recommended that a collection be made of all the varieties in the Garden at Chiswick, with a view to their proper classification.

July 16.—Bury St. Edmunds. Mr. Standish, of the Royal Nurseries, Ascot, exhibited several bunches of the *Royal Ascot Grape*; it is a new seedling of great excellence. Bunches of medium size, tapering; berries large, roundish oval, jet-black, with a beautiful bloom; flesh firm, crackling, with a slight Muscat flavour, rich and excellent. It was awarded a First-Class Certificate.

Mr. B. Fenn exhibited a collection of *Wines* made from outdoor Grapes. The Committee considered many of them were of very superior quality, and awarded them a Special Certificate.

August 6.—At this meeting, for the best dish of the newer varieties of *Cherries*, Mr. Cox, Redleaf, was awarded the First Prize for Bigarreau monstreuso de Mezel, a very fine late cherry.

For the best Green-fleshed Melon, Mr. Earley, Digswell, was

awarded the First Prize for a Melon, *Dr. Hogg*, which was of very good quality.

Mr. Standish, of the Royal Nurseries, Ascot, again exhibited the *Royal Ascot Grape*, which received a First-Class Certificate at the Meeting at Bury St. Edmunds. Mr. Standish stated that it was obtained by crossing two white ones, viz. the Muscat of Alexandria with Muscat Trovénen. The Committee confirmed the award it had received at Bury, stating that it fully maintains the high character it has received.

Mr. J. Beach, gardener to C. J. Harris, Esq., St. Juliens, Sevenoaks, exhibited a very excellent dish of *Morello Cherries*, for which he was awarded a Special Certificate.

Mr. Rivers, Sawbridgeworth, exhibited fruit of the late *Black Bigarreau Cherry* (*Bigarreau noire de Strasse*), which Mr. Rivers states hangs well on the trees till the end of August, later than any of the other black cherries. The fruit is of medium size, deep black, and shining; flesh dark, juicy, and rich. It was awarded a First-Class Certificate.

Mr. Rivers also exhibited two *Peaches*, a seedling from the Early York, with glandular leaves, which on that account may not be so liable to mildew as the parent Early York, which has no glands, it being a somewhat singular and remarkable fact that those peaches with glands are always less subject to mildew and much more robust than those without. The fruit resembles in every way the Early York. It was awarded a First-Class Certificate.

August 20.—At this meeting, for the best dish of *Peaches* grown on the open wall, Mr. Lynn, gardener to Lord Boston, was awarded the First Prize, Mr. Cox gaining the Second Prize.

For the best dish of *Nectarines* from open wall, Mr. Lynn was awarded a Second Prize.

For the best dish of *Apricots* from open wall, Mr. Earley, of Digswell, was awarded the First Prize, and Mr. Cox, of Redleaf, the Second.

For the best dish of *Peaches* from orchard-house, Mr. Douglass, gardener, Loxford Hall, was awarded the First Prize, with very beautiful Early Yorks.

For the best dish of *Nectarines* from orchard-house, Mr. Douglass was awarded the First Prize.

For the best three dishes of *Plums*, Mr. Cox was awarded the First Prize, with Jefferson, Reine Claude, and Hulings's Superb.

Mr. Tegg, gardener to the Duke of Newcastle, Clumber, exhibited some very fine *Grosse Mignonne Peaches*, for which he was awarded a Special Certificate.

Mr. Tegg also exhibited a very fine dish of *Guavas* (*Psidium Cattleianum*), for which he was also awarded a Special Certificate.

Mr. Earley, Digswell, exhibited two fruits of *Melon*, Dr. Hogg; neither of them was quite ripe. They were rather small, firm-fleshed, pretty highly flavoured, and seemed possessed of good properties if well ripened. Mr. Earley stated that with him it was one of the best Melons he grew. Very hardy and prolific.

Messrs. Stuart and Mein, Kelso, exhibited some of their *New Australian Spinach* (*Chenopodium auricomum*). In appearance it very much resembles *Chenopodium album*, the troublesome weed of our gardens. It is, when cooked, somewhat more fibry than the true Spinach, although partaking somewhat of its flavour. The Committee thought that it might prove a tolerable substitute when spinach was not to be had.

George R. Marten, Esq., Marshall's Wick, St. Albans, exhibited a small branch of a Peach-tree bearing both Peaches and Nectarines on it, a rather strange and unusual production.

Mr. Cox, gardener, Madresfield Court, Great Malvern, exhibited *Madresfield Court Black Grape*, a seedling raised by Mr. Cox from a cross between Muscat of Alexandria and Black Alicante. The bunches are long and tapering, like the Muscat of Alexandria, and were shouldered; the berries large, longish oval, of a jet-black colour with a fine bloom; the footstalks of the bunch are rather fine, erect, and those of the berry stout and warted; skin tough and membranous; flesh firm and juicy, rich and vinous, with a distinct Muscat flavour; leaves deeply lobed and serrated, bristly, with reddish-purple stalks and midribs. Mr. Cox stated that the fruit sets as freely as the Black Hamburg, and ripens a fortnight later than that variety, and a like period earlier than the Muscat of Alexandria. The Committee was very highly pleased with this Grape for its handsome appearance and good qualities, and awarded it a First-Class Certificate.

September 3.—Mr. Wm. Paul, Waltham Cross, N., exhibited a very large and interesting collection of thirty-seven varieties of *Apples*, which had been grown on small trees, worked on the French Paradise stock, only two years old, thus proving what an excellent stock it is for producing fertile little Apple-trees. Special Certificate awarded.

From the garden of the Society, Chiswick, came a collection of *Tomatoes* in pots. These were very interesting, and some of them, particularly the small-fruited sorts, highly ornamental.

From the Society's garden, likewise, came a large variety of *Figs*, which had been grown in pots; of these *Grosse Verte* was considered the finest, the fruits of which are very large, with a deep-green skin; flesh deep red, thick and syrupy, sugary and excellent. It was awarded a First-Class Certificate.

September 17.—At this meeting, for the best dish of *Peaches* from the open wall, Mr. Ruffett, gardener to Lady Palmerston, Broom's Barn, Herts, was awarded the First Prize for *Bellegarde*, Mr. Earley the Second.

For the best dish of *Nectarines* from the open wall, Mr. Ruffett was awarded the First Prize, Mr. Whiting the Second Prize.

For the best dish of *Peaches* from orchard-house, Mr. Tillery, gardener to the Duke of Portland, Welbeck, was awarded the First Prize, Mr. Whiting the Second.

For the best dish of *Nectarines* from orchard-house, Mr. Tillery was awarded the First Prize for *Violette hâtive*.

For the best three dishes of *Plums*, Mr. Whiting was awarded the Second Prize.

For the best dish of *Figs*, Mr. Hughes, gardener to the Rev. George Kemp, was awarded the Second Prize.

Mr. Beard, Surbiton, exhibited a seedling Pear named *Lord Suffield*. It resembled Williams's *Bon Chrétien*, but proved to be inferior.

Mr. Ingram, Royal Gardens, Frogmore, exhibited a seedling Plum named "*Bonne Bouche*." It is medium-sized, oval, yellow, slightly streaked with red, not unlike the *Jefferson*. Flavour rich, and excellent for the season. It was awarded a First-Class Certificate.

Mr. John Chalmers, gardener to E. J. Coleman, Esq., Stoke Park, Slough, exhibited four remarkably well-grown and finely coloured *Queen Pine-Apples*, for which a Special Certificate was awarded.

Mr. Thomas Shortt exhibited an "*Abbachiches*" *Pine-Apple*, but it was not sufficiently ripe for the Committee to judge of its quality.

Messrs. Veitch and Sons, Chelsea, exhibited a bunch of the *Muscat Champion Grape*. The berries were very magnificent in size, the flavour heightened by a slight trace of Muscat. On

former occasions when this Grape was exhibited, the deficiency in point of colouring was regretted; it is now somewhat improved in that respect, but still much is wanting to enable it to take the rank it would otherwise do. With this exception it is one of the most noble of our black grapes.

Mr. Fleming, gardener to the Duchess Dowager of Sutherland, Cliveden, exhibited a fruit of *Monstera deliciosa*, which had been ripened in a cool house; this appears to add greatly to its flavour. The pulp is very luscious, sweet, and rich, partaking of the Pine-Apple and Melon flavour, much intermixed with a minute sting, which is sometimes rather disagreeable.

Messrs. Lee exhibited a dish of *Royal Vineyard Peaches*, a seedling raised by the late J. Clark, Esq., Chiswick. In 1865 it fruited as an open standard, and was of very large size, melting, parting freely from the stone, and ripening late; it was thought to be a desirable variety on that account. It is hardy, and a good bearer, but in the present cold season it did not ripen well.

Mr. Wm. Paul again exhibited a large collection of *Apples* from small trees worked on the French Paradise stock, for which a Special Certificate was awarded.

George F. Wilson, Esq., exhibited some very fine examples of *Louise Bonne of Jersey Pears*, grown in an orchard-house, for which a Special Certificate was awarded.

Mr. Samuel James, gardener to the Earl of Dartmouth, Pats-hull, Albrighton, exhibited two seedling *White Grapes*, No. 7 and No. 8. They were both oval in shape, medium-sized, of a clear amber; both were slightly musky, but neither of them superior to sorts already in cultivation.

October 1.—At this meeting, for the best three dishes of *Dessert Apples*, Mr. T. Hughes, gardener to the Rev. George Kemp, was awarded the First Prize for Ribston Pippin, Cox's Orange Pippin, and Lewis's Incomparable, Mr. J. B. Whiting the Second.

For the best three dishes of *Dessert Pears*, Mr. Whiting was awarded the First Prize, for Louise Bonne of Jersey, Jersey Gratiolii, and Beurré d'Amanlis.

Mr. Ruffett, gardener to Lady Palmerston, exhibited two very handsome *Pine-Apples*, the one a Blood Pine, the other a Providence, weighing over 10 lbs., remarkably well grown and well developed, for which a Special Certificate was awarded.

J. Garland, Esq., Turnham Green, exhibited twelve unusually

large and fine specimens of *Blenheim Orange-Apples*, also a like number of *Dumelon's Seedling*, which were likewise very fine. A Special Certificate was awarded.

Mr. R. Headley, Stapleford, exhibited a seedling *Potato*, in appearance like a small "Fluke"; on its being cooked it proved very mealy and excellent.

October 15.—Mr. Ward, gardener to T. V. Miller, Esq., Bishops Stortford, Herts, exhibited three splendid smooth *Cayenne Pine-Apples*, weighing respectively $10\frac{1}{2}$, 10, and $9\frac{3}{4}$ lbs. They were awarded a Special Certificate.

Mr. C. T. Wells, Southend, Essex, exhibited a basket of very good *Black Hamburg Grapes*, which had been grown in "Ground Vineries." They were well ripened, and quite equal in size and colour to those usually grown in ordinary houses. The Committee awarded them a Special Certificate, with a high commendation of the principle of cultivation of these "Ground Vineries," by which grapes may be grown so easily and at so small a cost.

Mr. Wm. Paul exhibited a large, interesting, and very correctly named collection of *Apples* and *Pears*.

Mr. A. Colborn, gardener to J. Blyth, Esq., Woolhampton, exhibited a dish of *Solway Peaches*. They were large and handsome, and of pretty good flavour. It is sometimes a very useful variety for affording a late supply, being later than any other sort.

Henry Webb, Esq., Redstone Manor, Redhill, exhibited specimens of several varieties of *Pears*, showing the effect of the past season on the ripening of fruits; some were much cankered and others much cracked. This the Committee attributed to the late spring frosts and cold wet soil.

Mr. Lydiard, Albion Road, Hammersmith, exhibited very splendid examples of four sorts of *Celery*, also four sorts of *Onions*, exceedingly well grown. For each a Special Certificate was awarded.

Miss Fothergill, Somerset House, Old Shirley, Southampton, exhibited a painting of several varieties of Apples. The Committee considered they were very faithfully executed, and showed indications of talent in the delineation of Fruit.

Mr. Rivers, Sawbridgeworth, exhibited a fruit of a seedling *Peach*, raised from the Heath Clingstone. These Pavies, Mr. Rivers stated, may be kept the greater part of November in the fruit-room, and used for dessert cut up into slices and sprinkled

with sugar. Mr. Rivers also exhibited several sorts of stocks used for dwarfing the Apple-tree.

November 5.—At this meeting, for the best three dishes of *Dessert Apples*, Mr. Curd, gardener to M. G. Thoyts, Esq., was awarded the First Prize, with Blenheim Orange, Royal Pearmain, and Ribston Pippin, Mr. J. B. Whiting the Second.

For the best dish of *Huyshe's Victoria Pear*, Mr. Hughes, gardener to the Rev. George Kemp, was awarded the Second Prize.

For the best dish of any other variety of *Pear*, there were twenty-nine exhibitions, Mr. J. Garland being awarded the First Prize, with Doyenné du Comice, which is a most excellent pear; Mr. Buffett was awarded the Second Prize.

Mr. Perkins, gardener to C. Keyser, Esq., Stanmore, exhibited three very fine *Ripley Queen Pines*, for which a Special Certificate was awarded.

Mr. James Drewett, The Denbies, Dorking, exhibited a Melon called "*Denbies Greenflesh*." The Committee considered it the best-flavoured melon that had come before them this season, and awarded it a First-Class Certificate.

Henry Webb, Esq., Redstone Manor, exhibited fine examples of *Duchesse d'Angoulême Pears*, to which a Special Certificate was awarded.

The Rev. G. Kemp exhibited a dish of *Coe's Golden-Drop Plum*, much shrivelled, but exceedingly rich and good.

December 3.—Mr. S. Ford, gardener to W. E. Hubbard, Esq., St. Leonard's Lodge, Horsham, exhibited a large and excellent collection of exceedingly well-grown *Apples* and *Pears*, for which he was awarded Two Special Certificates. Mr. Ford likewise exhibited a very fine collection of twenty varieties of *Potatoes* and some fruit of the *Physalis Alkekengi* and *edulis*.

Mr. Wm. Paul exhibited a seedling *Apple* of very handsome appearance. It is above medium size, Pearmain-shaped; colour yellowish, streaked with red; flesh white, soft, with a slight flavour of the Ribston Pippin. It being somewhat past its season, the Committee requested to see it again.

Mr. Wm. Paul also exhibited some very fine *White Spanish Onions*, and examples of the stock used for grafting the Apple upon in his nursery.

Mr. Rivers, Sawbridgeworth, also exhibited examples of Apple-trees worked on the French and English Paradise stocks. The

French Paradise was of much weaker growth, and showed a tendency to root higher up the stem than the English Paradise.

Mr. Tillery, Welbeck, exhibited the following examples of well-ripened *Grapes*, with a view to elicit something as to the vexed question of flavour:—No. 1. Frankenthal. This was very deficient in colour, being nearly red; it was considered to be the sweetest amongst them. No. 2. Mill Hill. This was well coloured, and was placed second. No. 3. Welbeck Black Tripoli, which is a synonym of the Frankenthal. This was well coloured, and was placed third. The Muscat of Alexandria was very much shrivelled and russety, but was of exquisite flavour.

Messrs. Lane and Son, Great Berkhamstead, exhibited some splendid examples of the following *Grapes*, viz.:—Muscat Ham-burgh, Alicante (which is the true Black Tokay), Lady Downe's, Black Prince, Gros Guillaume, and Chavoush, for which a Special Certificate was awarded.

Messrs. Lane also exhibited a vine of the Alicante, laden with fine fruit, in a pot. There were eight or ten large and well-coloured bunches on it. Special Certificate awarded.

Mr. Ingram, gardener to Her Majesty at Frogmore, exhibited a very fine smooth *Cayenne Pine*, weighing 8½ lbs., one of many cut from plants only eleven months old. It was awarded a Special Certificate.

PRINCIPAL AWARDS OF THE FRUIT COMMITTEE

OF THE

ROYAL HORTICULTURAL SOCIETY.

FROM

1858 to 1868.

FIRST-CLASS CERTIFICATES.

FRUIT.

Apple, Balchin's Pearmain. Balchin. April 3, 1866.
Apple, Lord Burghley. House. March 21, 1865.

Apple, Roundway Magnum Bonum. Turner. January 29, 1864.
 Apple, Seedling. Tyringham. April 15, 1863.
 Apple, Seedling. Headley. August 26, 1862.
 Cherry, Bigarreau Noire de Strasse. Rivers. August 6, 1867.
 Cherry, Frogmore Early Bigarreau. Ingram. June 27, 1865.
 Citrons, Madras. Hill. Feb. 22, 1866.
 Fig, Lucrezia. Standish. October 6, 1863.
 Fig, Castle Kennedy. Fowler. April 30, 1865.
 Fig, Grosse Verte. R.H.S. September 3, 1867.
 Grape, Mrs. Pince's Black Muscat. Lucombe & Co. October 6, 1863.
 Grape, Madresfield Court. Cox. August 20, 1867.
 Grape, Chavoush. Constantine. August 13, 1861.
 Grape, Duchess of Buccleuch. Thomson, June 17, 1863.
 Grape, Royal Ascot. Standish. July 16, 1867.
 Grape, Royal Vineyard. Saunders. November 11, 1862.
 Grape, Stockeld Park. Faviell. December 9, 1862.
Monstera deliciosa. Vair. December 5, 1865.
 Melon, Denbies Greenflesh. Drewett, November 5, 1867.
 Melon, Oulton Park Hybrid. Wills. June 27, 1865.
 Melon, Persian Greenfleshed. Alves. October 6, 1863.
 Melon, Seedling. Bailey. October 9, 1860.
 Nectarine, Victoria. Rivers. September 10, 1861.
Passiflora laurifolia. Carr. October 16, 1866.
 Peach, River's Early York. Rivers. August 6, 1867.
 Peach, Slindon Park Seedling. Stewart. October 3, 1865.
 Pear, British Queen. Ingram. September 9, 1861.
 Pear, Autumn Nelis. Graham. October 19, 1862.
 Pear, Prince Consort. Huyshe. December 7, 1864.
 Pear, Seedling. M'Kelvie. February 11, 1860.
 Pear, Seedling. Betteridge. January 23, 1866.
 Pine, Seedling. Batger. November 11, 1862.
 Pine, Seedling. Oates. October 9, 1860.
 Plum, Bonne Bouche. Ingram. September 17, 1867.
 Raspberry, Belle de Fontenoy. Paul. October 3, 1865.
 Strawberry, Blackbird. Ingram. July 10, 1860.
 Strawberry, Dr. Hogg. Turner. July 3, 1866.
 Strawberry, Eclipse. Reeves. May 5, 1861.
 Strawberry, Frogmore Late Pine. Standish. July 31, 1860.
 Strawberry, Prince Arthur. Small. July 10, 1860.
 Strawberry, Sanspareil. Culverwell. July 31, 1860.

VEGETABLES.

Beet, Seedling. Dewar. November 7, 1865.
 Brocoli, William's Alexandra. Earley. May 7, 1867.
 Cabbage, Melvilles Sprouting. Melville. April 9, 1861.
 Cucumber, Seedling Ridge. Garaway. August 8, 1865.
 Orach, Giant. Lee. July 17, 1866.

CERTIFICATES OF COMMENDATION.

FRUIT.

Grape, Lady Downes, Thomson. April 4, 1862.
 Grape, Lady Downes. Saunders. January 29, 1864.
 Grape, Muscat of Alexandria. Tillyard. January 21, 1863.
 Grape, Black Hambro. Spray. April 9, 1861.
 Nectarines, a box of. Gardiner. September 10, 1861.
 Peach, Thames Banks. Rust. September 22, 1863.

14. Another of the most important functions of the Chiswick Garden has been liberally worked in the distribution of grafts of fruit-trees, of which no less than 1500 parcels have been received by the Fellows of the Society during the past season.

15. The advantages arising from the demolition of the old and diseased fruit-trees which occupied some of the belts in the kitchen garden having been attended with beneficial results to the garden, the Board would suggest to the Council that the greater portion of the old orchard of unproductive standard trees should be trenched over, and the ground appropriated to the reception of the young trees raised from scions of those which had been destroyed, along with others forming a numerous collection which have been obtained at various times from pomologists of the continent of Europe and the United States of America. These old orchard-trees, as they at present exist, are perfectly worthless, and occupy a large extent of ground, which is thereby rendered unproductive. If this were done, not only would there be room for the young plantation of pyramidal and bush fruit-trees, but space available also for the production of vegetables and the more common fruits, for which there is an increasing demand by the Fellows; while there is less inquiry for grapes and the higher class of fruits.

16. The peach wall, which at one time was the pride of the garden, has for some years been gradually losing its interest; the trees, many of which are coeval with the wall itself, having fallen into the decrepitude of age, occupy space which might be more serviceably employed. The Board would suggest that these old trees be removed, and their places filled with young trees of choice varieties, which will serve not only as a source of income by the sale of the fruit but as examples of the different methods of training and the most approved modes of pruning wall fruit-trees. The trees in their present condition afford no instruction in this latter respect; and it is most important in an establishment like the Garden of the Society, which is chiefly maintained for experimental and educational purposes, that the training and pruning of fruit-trees should form an important feature.

SCIENTIFIC COMMITTEE.

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The Duke of Buccleuch, K.G.

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W. Wilson Saunders, F.R.S.
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SECRETARY.

Rev. M. J. Berkeley, F.L.S.

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Hooker, Dr. Joseph, F.R.S.	Wilson, Geo. F., F.R.S.

Address by the Secretary,

Rev. M. J. BERKELEY, *April 20th, 1868.*

As this is the first meeting of the Scientific Committee of the Horticultural Society, it seems advisable that the Secretary should offer some observations on its objects, and the best means of carrying them out effectually. It is above all things necessary that we should perfectly understand the position in which we are placed as a Committee, and the more especially as its Members are not necessarily Fellows of the Society.

The Society, it must be remembered, is not exactly in the same position as most other learned Societies, with the exception perhaps of the Zoological Society. Though the income is large, it is not simply available, as in other scientific bodies, for purely scientific objects. The funds applicable to publication are necessarily limited, and it is to this cause especially that the discontinuance of the first series of the Journal, and the occasional ap-

pearance of the new series, are attributable, and not to any lukewarmness or narrowness of views on the part of the Society. If the history of learned Societies were to be accurately traced, we should find that the appearance of their Transactions has for the most part been irregular, and in consequence the publication of important papers has frequently been seriously delayed; and for this, amongst other reasons, the 'Comptes Rendus' of the meetings of the French Institute was projected, to enable authors of valuable memoirs to register their discoveries, or in other words "pour prendre date." It must not therefore be assumed that our Journal can be published oftener than once or twice a year, or, under the most favourable circumstances, more frequently than once a quarter; but as reports will undoubtedly appear in our leading horticultural papers, no unwillingness on the part of authors to present memoirs at our meetings need on this score be anticipated.

The object of our meetings, as stated in the number of the Proceedings just published, is to promote and encourage the application of Physiology and Botany to purposes of practical culture, whether of plants, or trees, or shrubs, and to originate experiments which may assist in the elucidation of such questions. The terms, it is clear, are sufficiently large to include everything which can come within the scope of a Botanical Committee, and are by no means to be confined to what may strictly be termed physiology or biology. Morphology as well as vital action will occasionally come before us; questions of nomenclature, information of general horticultural or more purely botanical interest, botanical geography, in short everything which does not fairly come within the compass of the Floral or Fruit Committees. The several Botanical Directors will naturally bring before us any matter of interest which may occur in the fruit or floral departments, or which may suggest itself at Chiswick, such as have usually been laid before the Society at its Tuesday meetings; doubtful plants will be presented to us for determination, subjects which require elucidation will be mooted, and occasional papers read in accordance with the especial objects of the Committee. Not only is it hoped that individual members of the Committee will help us, but the co-operation of the Fellows of the Society in general, and indeed of men of science, whether members or not, is earnestly invited.

As regards purely physiological matters it is highly necessary that we should set out with a distinct understanding. It is easy

to suggest experiments, but we must at the same time appreciate the difficulties which attend them. Any expectation that the Society itself can at once enter upon a large series of delicate experiments would only meet with disappointment. We ourselves cannot fail to appreciate at once the difficulties of the subject, but it is necessary also that the Members of the Society, and the Horticultural world in general, should equally realize the true state of the case. The successful conduct of purely physiological experiments requires an innate love of the necessary research, unwearied labour in the pursuit, uninterrupted leisure, and a rare combination of tact and talent, patient of failure, yet confident of ultimate success, at once free from prejudice, and ardent in the pursuit of the especial object of research. It must be a labour of love or it will lead to nothing. The Society trusts that the establishment of this Committee may inspire some of its members with the requisite zeal; but it must at once be clearly understood that it would be impossible for it, as a preliminary step, to organize a staff purely for such a purpose. It would be almost hopeless at the present moment to find a person competent for the leader of such a staff, even at a large salary; several assistants would be requisite, perfect instruments, and a chemical laboratory, while the person who might be great in one direction would be almost useless in another. Such investigations must to a great extent be carried out, in the first instance at least, by private individuals; but the Society would not be backward in giving pecuniary assistance, where there was a reasonable prospect of important results. Minor experiments would, indeed, immediately come within the scope of the Society, as the reciprocal influence of stock and graft, the modifications produced by different stocks, varieties in the mode of culture, the influence of different kinds of manure, and, indeed, a host of other matters, meteorological, physiological, and practical, which may tend to the promotion of scientific Horticulture.

There is also another direction in which the Committee might be extremely useful, and which would at once be acceptable to all our Members and all other lovers of horticulture. It is frequently a complaint that plants in collections are so badly named, and that the correct appreciation of what may be called their botanical attributes, in contradistinction to those which are simply floricultural, is at present so very imperfect. This arises in great measure from the want of useful manuals, from which the necessary informa-

tion can be obtained. When the number of plants under cultivation was comparatively small, the 'Hortus Kewensis' was available for the more scientific gardeners; but though there are some praiseworthy exceptions, such as Loudon's 'Arboretum,' the cultivator is for the most part compelled to pore over mere catalogues, which can give him only an empirical knowledge, while as frequently he will fall into error. It is believed that the publication of a series of manuals, judiciously selected, would be highly calculated to promote a general love of scientific botany where there is at present mere floricultural knowledge, and the more so as the desire of mere display seems on the wane, while an appreciation of elegance of form and foliage, and delicacy and variety of structure, is daily increasing. Each volume might be complete in itself, while if the plan were well carried out a series of publications would be produced, highly honourable to the Society and of great importance to Horticulture. The suggestion, I would observe, originated with a member of our Committee, who has the power and the will at once to aid in the realization of such a scheme; and when I mention Dr. Hooker as its originator, it will assuredly be evident how materially it might be promoted by the staff at the Herbarium and the Superintendents of the different departments in the Gardens at Kew. Suppose, for instance, we were to undertake a volume on Conifers, for which Gordon's manual is now quite insufficient, another on Herbaceous plants more usually cultivated, another on Rock and Alpine plants—or, to descend to especial genera, one illustrating *Dendrobium*, *Epidendrum*, and *Oncidium*—what a boon would such volumes be to our Members. The scheme, moreover, with the aid which has been promised, might be carried out at a comparatively small expense, and with a degree of speed and correctness which would be quite out of the power of any individual.

The Committee will of course be prepared to receive suggestions as to any other plans or modes of action which may be thought advisable; but it is absolutely necessary that such suggestions should be submitted in writing, that the terms may be distinctly understood. Their ultimate adoption will of course rest with the Council.

MAY 5, 1868.

WILSON SAUNDERS in the Chair.

The Minutes of the last Meeting were read and approved.

Dr. Masters made some observations on a peculiarity of structure which he had observed in the petals of the female *Aucuba*. They are much more strongly studded than those of the male with minute warts, which terminate in a little hair, and are sprinkled with plates of cuticular tissue. The pollen-grains, which retain their fecundity a long time, become entangled amongst them, and impregnation by insects is in consequence promoted.

A letter from G. Maw, Esq., offering to promote the views of the Committee was read, and the Secretary directed to communicate with him.

Two pieces of Fir were sent by G. D. Pollock, Esq., supposed to have been killed by an insect burrowing in the inner portion of the bark.

Further information was desired as to the condition of the trees before attacked by insects.

A letter from Mr. Earley, of Digswell, on the spot in Orchids was read.

A letter on the same subject from Mr. James Hossack was read.

The Committee then proceeded to the order of the day, viz. the discussion on the spot in Orchids.

Mr. Berkeley adverted to the articles by himself and Mr. Anderson in the 'Gardeners' Chronicle' for February 18, 1865, and showed some of the specimens in a dried state on which those articles were founded, distinguishing three forms of spot, the chlorotic, the black spot, and the putrid spot, besides spots arising from fumigation.

Mr. Marshall brought a great quantity of illustrative specimens, in one of which the three forms mentioned above were present at the same time. He brought, also, one, simulating the black spot, produced by Thrips. He stated that many valuable plants became unhealthy from sudden checks at floral shows.

Double-glazing was stated to be the surest remedy as far as they were affected by drip.

Mr. Blenkins made some observations on the microscopic condition of the leaves, especially of the stomates, whose guard-cells

were much affected, and the nuclei of the affected cells discoloured.

A Committee was then appointed for the consideration of the subject, consisting of Messrs. Berkeley, Blenkins, Marshall, Masters, Murray, and Thomson, to meet at Messrs. Veitch's, May 20.

The subject of nomenclature was postponed to the subsequent Meeting, the second subject for discussion being, "To consider what assistance can be rendered to Dr. Signoret in working out the Natural History of Coccidæ."

The Meeting then adjourned.

MAY 19, 1868.

T. THOMSON, M.D., F.R.S., in the Chair.

The Minutes of the last Meeting were read and confirmed.

Some specimens of Orchids and other leaves were exhibited by Dr. Welwitsch, showing different forms of spot which occur in Africa. He believes that it is a constitutional disease analogous to scrophula.

A leaf of an Orchid with undoubted black spot, just imported, was sent by Mr. Wilson Saunders.

Specimens of the larva, in its case, of some species of *Coleophora*, which has been very injurious to Pears at Chiswick, were brought by Mr. Berkeley. He stated that *Coleophora hemerobiella* has been very busy this year on Cherry-trees, and some species in the larva state has since been observed by him, in Leicestershire, on Elm.

A translation of a letter from M. Alphonse DeCandolle on Nomenclature was then read, on which a discussion took place, and it was proposed and carried unanimously—

"That a Sub-Committee, consisting of Dr. Thomson, Dr. Hogg, and Mr. Moore, be appointed to consider the Nomenclature of Garden Plants."

It was then suggested by Dr. Welwitsch that experiments should be made on the cultivation of different species of *Loranthus*, many of which are of great beauty and interest.

The subject of Nomenclature to be resumed at the next Meeting, the second subject being that of the Coccidæ, as previously proposed.

The following is a translation of M. DeCandolle's letter:—

"I find (says the learned Professor) from the 'Gardeners' Chronicle' that your Committee, which has been so happily conceived and judiciously constituted, is about to occupy itself with the nomenclature of plants. Allow me to address a few observations, not with the intention of supporting the rules which I laid before the Congress at Paris in 1867*, for they are in general agreeable to the principles recognized by English botanists, but to render certain details more perfect, and to prevent certain inconveniences, especially in what concerns the nomenclature of cultivated species.

"I may remark, first, that it is always more easy to propose laws than to apply them judiciously. This is obvious as regards civil laws, the discussion of which in Parliament is simple in comparison with all the comments of advocates and judges before the courts of justice. It is the same with respect to scientific questions. We assert, for example, that the names of species must be in Latin; this is clear and simple enough thus generally stated, but when applied we have frequently to ask, if a particular word is Latin, what is its genitive, how it must be accented, &c. Another application of the laws of nomenclature is to find the name of a plant and to choose amongst several existent names that which is not inappropriate.

"I do not know whether the Committee will enter on the immense field of applications; but clearly it will be engaged in the principles of nomenclature, and I hope that it will support everything which has a tendency to improve the work to which I devoted myself, together with a great number of botanists of different countries, in 1867. It is with respect to cultivated plants that the Committee is in a position to exert a beneficial influence, and it is natural that botanists should wish to make suggestions on a point of such difficulty.

"I set out, in my 'Laws of Botanical Nomenclature,' from the conviction that the numerous modifications of a cultivated species may be regarded under two points of view—

"a. The relative importance of the modifications, which presupposes the study of the forms, and the degree of their hereditary relationship.

* 'Laws of Botanical Nomenclature adopted by the International Botanical Congress held at Paris in August 1867, with an historical introduction and a commentary by Alph. DeCandolle.' London, 1868. Reeve & Co., Henrietta Street.

"b. The origin of the modifications by crossing, seed, or division.

"Under the first point of view we are obliged (Art. 14 and 19) to class the modifications of cultivated plants, as of spontaneous species, under subspecies, varieties, subvarieties, variations, and subvariations. Every form of a certain importance is habitually hereditary, as we have admitted that, heredity once established, a subspecies is equivalent to a *race* (Art. 14), and that a variety whose heredity is almost constant is a *subrace*. Variations and subvariations still show some tendency to heredity. This system is easily understood, though in practice we find many difficulties in the classification of forms according to their value and constancy.

"The second point of view, that of origin, is at once more difficult and more important. We have distinguished (Art. 12 and 14), as to origin,—

"1. *Hybrids*, or products of two species.

"2. *Half-breeds* (*métis*), or products of two modifications of a species.

"3. *Seedlings*, or forms sprung from seed.

"4. *Sports*, or forms originating from a bud, tubercle, or other organ by division or extension.

"It is clear that seedlings may originate from cross-fecundation; but when this is not positively known, we must be contented with the fact of the origination from seed. The word *Seedling*, if it does not teach us much, is at least exact. *Sports* must originate from certain causes, as an ancestor of a different form, an actual or anterior influence of climate, &c.; but the obscurity of these causes is precisely what justifies the use of the word, on the principle of not saying more than we know.

"I do not suppose that any objection will be made to the use of these words, which are widely diffused; only there are doubts as to the most convenient mode of naming hybrids, half-breeds, seedlings, and sports; and it is on this point that I wish to present some observations to the Committee.

"Hybrids and Half-breeds."

"The practice of naming hybrids by a combination of paternal and maternal names has been introduced into botany. This practice is philosophical; but unfortunately some authors have placed the name of the male parent first in the bracket, and others that

of the female. Moreover, the male parent has frequently been *assumed*, and this on very questionable or even erroneous grounds, as, for example, that we can determine the father and mother from the form of the offspring, the one or the other having a preponderating influence. The Congress at Paris was, not without reason, disgusted at such diversity of usage and rash assertions. It first established the fact that the majority of authors (whether right or wrong) put the name of the father first, and has in consequence proposed to follow this practice. At the same time it found such inconvenience attendant on these double names, imposed frequently by chance, that, in order to give some check to the practice, it adopted the system only when *the origin was known by actual experience* (Art. 37); that is to say, when the pollen of one species was applied to another, and there could be no doubt with respect to the parentage. Whenever any doubt existed as to the origin of the pollen, the hybrid or half-breed was to receive some name different from that of the combined names (Art. 37, 40).

"Should your Committee, like ourselves, recognize the inconvenience attendant on the combined names, they would do well to persist in this restriction; for example, they would beg of horticulturists to assure themselves, before giving a double name, that all the proper precautions had been taken to prevent the access of strange pollen by means of wind or insects. The combined names would then be confined to those cases in which an extremely accurate experimentalist had taken all needful precautions to obtain a certain result,—that is to say, that double names would be mostly confined to scientific books, and rarely admitted into mere garden catalogues. The thousand and one crosses in which it is not absolutely certain whether a single pollen only has had access would receive names analogous to those of the species if we have to do with hybrids, or to those of seedlings or sports if they be half-breeds, while many would receive no especial name, which would be the most reasonable practice.

"We may remark, in passing, how much more reasonable the breeders of domestic animals are than the raisers of cultivated plants. They give names to the half-breeds between the races of the same species, but there is a certain point at which they stop. They have not the assurance to give names to all the forms; as, for example, to dogs which spring from individuals which are

the Scotch firs attacked by some insect, in which he states that the trees were in a healthy state when attacked. As some doubt still existed, further information was desired.

A letter from Mr. Maw was read containing a sketch of the kind of glass requisite for making the experiments concerning the influence of light of different colours on the flavour and colouring of fruits, and the Secretary was desired to ask Mr. Maw to be so good as to send a working model.

A letter from Dr. Gilbert was then read suggesting experiments on the characters of growth, whether of form or function, by virtue of which one plant dominates over another in mixed herbage under the influences of different manures or other conditions.

Dr. Gilbert then gave some very interesting details of experiments carried out by Mr. Lawes and himself, and, after a discussion, Members of the Committee were invited to inspect the spot where the experiments were made.

The subject was recommended to the especial attention of the Chemical Sub-Committee, who were requested to associate with them one or more botanists.

Mr. Wilson Saunders and Professor Westwood suggested that an exhibition of noxious and useful insects should be organized by the Society.

Mr. Wilson Saunders called attention to the Lindley Library, to which contributions were requested.

It was then proposed that the subject of experiments on Grasses should be especially brought before the Council, with a view to obtain a grant in furtherance of the proposition of Dr. Gilbert.

And, finally, that the subject of Coccidæ should be brought before the next Meeting.

The Meeting then adjourned.

May 19, 1868.

MY DEAR SIR,—In reply to your note respecting the condition of the tree previous to the attack of the insect, specimens of which I sent you, I may, I think, safely state that the tree in all respects is perfectly healthy and vigorous previous to this insect attacking the bark. I have watched several trees for the last three or four years, healthy in the first instance, then seen to be selected by this insect, the points of entrance through the bark being indicated by turpentine exuding therefrom; and then, in about two years, the tree begins to show evidences of death, the ends of the branches, or top especially, beginning to die first, and shedding

its leaves, until the whole turns brown and dead. The ravages of the insect are evidently confined to the tissues external to the hard wood; for I have not yet seen an instance in which the wood has been penetrated. The insect bores a perfectly round minute hole through the hard outer bark; and when this is looked at, at an early period after perforation, there is always found an exudation of turpentine, dried and brittle, but projecting about the $\frac{1}{4}$ th to $\frac{1}{2}$ th of an inch in extent, the free extremity trumpet-shaped, but *open* and communicating with the perforation in the bark by a *passage* from the free extremity. If the perforation in the bark be traced further, it will be found to communicate with "a burrow" or "run" under the bark, the direction of which is chiefly upwards and somewhat tortuous. My belief is, that thousands of these insects burrowing between the wood and bark, at last entirely destroy the *vital* connexion between the two, and thus the tree is destroyed; for when the tree is dying or nearly dead, if the bark be stripped off, it is found to be perfectly dry and separated to a very great extent from the wood by numerous subterraneous passages or runs.

The insect, as far as I can observe, solely attacks the Scotch fir. I have not seen any very old tree yet affected thus; but trees of thirty years' old have been destroyed, and many as young as ten to twelve years. I have many now on my ground in which the stages of attack and death may be witnessed.

I have not been able, from want of leisure, to detect the insect, and can give no information on the subject, and I have only observed its ravages for some five or six years. If it continues it will seriously affect the growth of Scotch fir in our neighbourhood; but with the opportunities of planting Douglas pine more *cheaply* hereafter, we shall, I believe, be gainers in the end.

Yours sincerely,

GEO. POLLOCK.

Harpenden, St. Albans,
May 30, 1868.

SIR,—I herewith enclose the Agenda-sheet, with the title of a subject proposed for the consideration of the Scientific Committee.

It is obviously impossible adequately to indicate the range and bearing of a subject in a short title, nor can I hope to afford sufficient explanation in a note; but I shall be glad to go further into the matter at the next Meeting of the Committee, if desired.

I may mention, however, that the facts which would supply the material for the consideration of the Committee have been provided as follows:—

In the series of investigations conducted by Mr. Lawes and myself at Rothamstead, a portion of his park, which has probably been under grass for centuries, has been divided into plots, each of which has been treated in the same way as to manure, year after year, for more than a dozen years—there being nearly twenty plots, and nearly as many manurial conditions. It was soon found that the relative predominance of various species of the complex herbage rapidly changed, according to the description of manure employed; on three occasions carefully selected samples have been submitted to what may be called botanical analysis. The produce of 1867 was so treated, and the separations have occupied several pairs of hands from the time of cutting last year until only a few weeks ago.

As a general result, it may be stated that whilst the unmanured produce is found to comprise about fifty species, that from some of the plots includes less than half that number; and not only may the plants of certain orders be almost excluded under certain conditions, and most strikingly increased under others, but individual species, even among the grasses themselves, are affected in no less a degree. It will be seen that the results afford most striking and interesting illustrations of the "struggle for existence" among plants. It is our intention to follow up the investigation in the same manner as hitherto; but we cannot but feel very strongly that there is a point beyond which we, as chemists and agriculturists, cannot hope to carry the subject, and that the results open up a very fruitful field for the study of the botanist and vegetable physiologist, and might prove of much interest, and deserve much elucidation, if considered from so many points of view as might suggest themselves in discussion by a body representing so many branches of science as the Scientific Committee.

I will bring with me, on Tuesday, some tabular summaries of the results; but I may mention that the plots themselves are just now in a very interesting condition for inspection, and Mr. Lawes begs me to add he will have much pleasure in sending an invitation to each Member of the Committee, should it be convenient to find a day for a visit to Rothamstead.

Yours truly,

J. H. GILBERT.

JUNE 16, 1868.

A. MURRAY, Esq., in the Chair.

The Minutes of the last Meeting were read and approved.

Two letters from Mr. G. Maw, respecting the coloured shades proposed for experiment, were read.

Major Clarke made some observations on the effect of coloured glasses on the colouring of Dahlia-flowers.

Yellow and red were as darkness, blanching the flowers.

Deep blue made the colouring more intense, while the effect of green was intermediate.

A white Calceolaria, which he hoped would prove permanent, had been produced under the influence of coloured glass.

It was recommended that similar experiments should be carried out at Chiswick.

Mr. Lee, of Clevedon, sent diseased pears, cherries, &c., which were unfortunately almost in a state of putrescence. The pears were, however, still in such a state as to make it probable that they suffered from the effect of frost, which in the first instance attacks the stigmas, which, sooner or later, according to the degree in which they have suffered, communicate a taint to the ovules, and from thence to the surrounding tissue. It was observed by Dr. Masters that the lining at the base of the calyx sometimes suffers even sooner than the stigmas.

Dr. Hogg exhibited monstrous flowers of the common foxglove, in which the corolla was much enlarged by fusion, and the stamens and pistils had undergone various modes of transformation.

A conversation then arose respecting the effect of manure, the failure of attempts to make artificial farmyard manure, and the beneficial effects of cotton-cake on cotton, hopbines on hops, and the prunings of vines on vines, also of nitrate of soda on cotton.

Specimens of *Reseda Phyteuma* were exhibited by Major Clarke as the possible parent of the garden Mignonette.

Mr. Reeves brought specimens of Strawberries, in which the petals were not deciduous, though the fruit was large and perfectly developed.

Finally, it was proposed that Dr. Voelcker should report on the effects of different manures on vegetation at the next Meeting.

The Committee then adjourned.

JULY 7, 1868.

WILSON SAUNDERS in the Chair.

The Minutes of the last Meeting were read and approved.

The Report of the Chemical Sub-Committee on the effect of different kinds of manures by Dr. Voelcker was read and ordered to be printed.

The proper subjects for experiment were discussed and finally selected.

A communication, with reference to the procuring a quantity of pure seeds of the twelve plants selected, to be made to Mr. Gibbs at Leicester.

It was determined that the experiments should commence in April next.

Mr. Wilson Saunders brought specimens of lime-leaves covered with *Erineum*, and suggested that especial attention should be paid to the numerous spots and growths on leaves to which the present abnormal season appears to have given rise.

He brought also a proliferous flower-stalk of *Primula cortusoides*.

Dr. Hogg called attention to some peculiar patches on the leaves of a variegated elm, which appeared, from drawings laid on the table by Mr. Murray, to be due to the anomalous production to which Desmazières gave the name of *Acalyptospora*.

Mr. Berkeley stated that *Sirex juvencus* was abundant this year in Northamptonshire, and that *Sirex gigas* had occurred in two places in the same county.

Dr. Masters brought from Chiswick a branch of a rose in which the leaves had partly assumed the appearance of petals.

He also laid on the table some curious specimens of Gnaws from an oak, in which numerous buds were produced on the surface.

Dr. Welwitsch laid on the table some specimens of *Cocci*, of which notice will be taken when the subject of Coccidæ is brought forward for discussion at the next Meeting.

Some white lilies, *L. eximium*, *L. longiflorum*, and *L. Takiscima* of Siebold, were brought by Mr. G. Wilson for comparison.

A rose-stem was sent by Mr. Ivery curiously surrounded by the eggs of the lackey moth.

And, finally, a plant of *Richardia æthiopica* was sent by M.

D'Arnaud, in which the leaves presented the appearance of spathes.

The Meeting then adjourned to August 4.

AUGUST 4, 1868.

Dr. THOMSON, F.R.S., in the Chair.

The Minutes of the last Meeting were read and approved.

A letter from Mr. Wilson Saunders was read regretting that he could not bring forward the subject of Coccidæ at the present Meeting.

Specimens of a *Coccus* which has attacked a French variety of fig were laid upon the table.

The printed Report of the Chemical Sub-Committee on the influence of different manures &c. was laid on the table.

It was suggested and approved that *Lotus corniculatus* should be substituted for *Medicago lupulina*, and either *Bunium flexuosum* or *Carum Carui* for *Daucus Carota*, should it be found impracticable to procure seeds of the former; Dr. Gilbert, however, promised to collect both seeds and tubers should it be possible to do so.

A letter from Mr. W. Marshall was read, suggesting that half the manure used in the experiments should be mixed with the upper half of the soil, and half used afterwards as a top dressing.

Dr. Voelcker, however, stated that it was not at all certain that the manure would be washed out, and that, in the proportion of manure recommended for experiment, Mr. Marshall's objections had been in some measure anticipated.

Dr. Masters laid on the table a very interesting series of forms of *Croton variegatum*, showing the most extraordinary changes.

Dr. Thomson stated that he had seen almost all these forms in the Calcutta garden, and that three or more different forms often occurred on the same plant.

The Meeting then adjourned to November 17.

REPORT OF CHEMICAL SUB-COMMITTEE. Drawn up
by Dr. AUGUSTUS VOELCKER.

At the Meeting of the Scientific Committee of the Royal Horticultural Society held June 2nd, 1868, Dr. Gilbert brought forward the subject of "The characters of growth by virtue of which

one plant dominates over another in mixed herbage, under the influence of different manures," &c.

This subject, having excited considerable interest and discussion, was referred to the Chemical Sub-Committee, with the request to report whether the Sub-Committee deem it desirable to recommend experiments to be tried as likely to throw further light on various questions relating to vegetable growth and the specific action of certain fertilizing elements, such as potash, phosphate of lime, nitrogenous matters, &c.

It will be remembered that Dr. Gilbert, at the June Meeting, referred to some very striking experiments conducted for many years at Rothamstead Park by Mr. Lawes and himself on permanent pasture, which has been under grass probably for centuries.

Under ordinary management this herbage yielded about fifty species of graminaceous, leguminous, and other plants usually found in permanent meadows.

The number of species of plants was but little changed on those experimental plots in the park to which a complex but purely mineral manure was applied, consisting of salts of potash, soda, magnesia, and sulphate and phosphate of lime.

On the other hand, salts of ammonia, nitrate of soda, applied by themselves, or the addition of nitrogenous manures to mineral fertilizing matters, greatly diminished the number of species in the herbage.

According to the particular kind of nitrogenous manure used, and the quantity and combination with other fertilizing matters in which nitrogenous manures were employed, the diminution in the number of species varied; but in all cases it was strikingly apparent, and in some instances amounted to about one-half of the species in the herbage from the unmanured part of the park, or those dressed with purely mineral manures.

Attention was further directed to the fact that not only the weight of the produce reaped per acre was much influenced by the description of the manures which were put on the different experimental plots, but that likewise the relative proportions of graminaceous and of leguminous and miscellaneous plants in the produce were found to vary considerably with the manures employed.

Thus, to cite only a few examples, the weight of the graminaceous plants in the produce from the unmanured plots, and those dressed with purely mineral manures, in round numbers

amounted to about 60 per cent. of the whole produce. Dressed with salts of ammonia or nitrate of soda, and other purely nitrogenous manures, the herbage yielded from 70 to 80 per cent. of the whole weight of produce in graminaceous plants; and in some instances in which an abundance of both nitrogenous and mineral manures were employed together, the weight of the graminaceous plants in the whole produce amounted to nearly 95 per cent.

The effect of nitrogenous manures in encouraging the growth of true grasses, and raising the weight of graminaceous produce and the corresponding diminution of the weight of the leguminous and miscellaneous plants in the produce, was strikingly exemplified in these experiments.

On the other hand, it was found that purely mineral manures, such as salts of potash and phosphate of lime, favoured materially the growth of the clover tribes, and greatly increased the percentage by weight of the leguminous plants in the whole produce of the permanent pasture.

A wish having been expressed by several members of the Committee to inspect the interesting and highly important experiments which for a succession of years have been carried out and are annually in progress at Rothamstead Park, Mr. Lawes kindly issued an invitation, of which several of the Members were able to avail themselves.

The remarkable character of the results obtained in experiments on permanent pasture, and other no less interesting results, having reference to the growth of wheat, barley, beans, and other crops, highly impressed the visitors with the importance of the experimental inquiries instituted at Rothamstead in relation to many physiological and horticultural problems.

At a subsequent Committee Meeting it was agreed to call together the Chemical Sub-Committee, who, regarding the cooperation of botanists and others interested in vegetable physiology, were joined by Dr. Masters, Dr. Hogg, Mr. Murray, Major Trevor Clarke, and Mr. Miers, Dr. Hooker and Mr. Bentham expressing regret at being unable to attend the Meetings of the Sub-Committee.

Accordingly the Sub-Committee met on Thursday, June 18th, the following Members being present:—

Professor Abel.

Dr. Gilbert.

Mr. G. F. Wilson.

A. Murray.

Dr. Masters.

Dr. Voelcker.

Dr. Gilbert invited the botanical Members of the Sub-Committee to examine the herbage reaped this season on the several experimental pastures at Rothamstead Park, and promised to furnish them with the requisite materials for such a botanical examination.

The Sub-Committee next fully discussed the manner in which manuring experiments on graminaceous and other plants occurring in pastures might with advantage be instituted, and considered it advisable to investigate rather the more strictly scientific physiological questions, which no doubt will suggest themselves in the course of the experiments, than to bear in mind the purely agricultural and economic points of interest which they may present.

Instead of growing together a number of plants such as are common in pastures, it was deemed desirable to study the influence of various manures on particular species, grown separately in wooden boxes 2 ft. square and 18 ins. deep, filled with poor soil, such as is found in unmanured and rather exhausted soils of our fields, and not with good garden-mould.

The boxes are conveniently sunk in the land, level with its surface, in order to protect the soil in them from excessive evaporation.

It is suggested that the experiments be carried out in the Society's Gardens, at Chiswick, and also at Rothamstead by Mr. Lawes and Dr. Gilbert, as well as by any gentleman who feels disposed to undertake them.

In each set of experiments the same kind of soil should be employed; but as the nature of the unmanured soil must exercise its due influence on the growth of the plants submitted to experiments, it will be desirable, if possible, to try one series of experiments on rather light sandy soil and another on more heavy clayey soil. Dr. Voelcker will willingly undertake the chemical analysis of any soils that may be employed for the experiments.

After due deliberation the Chemical Committee have selected the following plants for experiments:—

1. *Dactylis glomerata*.
2. *Anthoxanthum odoratum*.
3. *Lolium perenne*.
4. *Poa pratensis*.
5. *Poa trivialis*.
6. *Bromus mollis*.

7. *Trifolium pratense* (*perenne*), red clover.
8. *Medicago lupulina* (*perennis*), yellow clover.
9. *Trifolium repens* (*perenne*), white or Dutch clover.
10. *Plantago lanceolata*.
11. *Achillea millefolia*.
12. *Daucus carota*.

It will be seen that, of the dozen plants recommended for experiment, six are true grasses, three clovers, and three common weeds in pastures.

For each of the preceding plants, six boxes, each 2 ft. wide, and 18 inches deep, are recommended :—

1. One box to be left unmanured.
2. " manured with a purely mineral mixture.
3. " " " ammonia only.
4. " " " nitrate of soda only.
5. " " " ammonia and mineral manures.
6. " " " nitrate of soda and mineral manures.

The following manures and quantities are recommended :—

	ounce.		per acre.
For box 2.	1·47	{ of sulphate of potash, or at the rate of	1000
	1·47	carbonate of lime	1000
	·15	chloride of sodium	100
	1·47	bone ash treated with	{ 1000 750
	1·10	sulphuric acid	
For box 3.	·59	sulphate of ammonia	400
	·59	chloride of ammonia	400
For box 4.	1·62	nitrate of soda	1100
For box 5.	The manures used in 2 and 3.		
For box 6.	"	" 2 and 4.	

The amount of nitrogen in the preceding quantity of nitrate of soda recommended for box 4, it may be observed, is the same as that in the sulphate of ammonia and chloride of ammonia employed in box 3.

Dr. Gilbert has kindly promised to furnish the preceding manures, which should be intimately incorporated with the whole of the soil in the several boxes.

When necessary, the plants under experiment should be watered with soft pure water, and otherwise attended, and their progress be watched and recorded.

A sample of water to be retained for examination when distilled water cannot be used.

It may, perhaps, also be desirable to fill moderate-sized flower-pots with soil from each of the experimental boxes, and to grow in each a single and strong plant, side by side with the more numerous specimens in the several boxes.

The preceding experiments cannot be undertaken without a good deal of trouble; but it is confidently expected that they will throw light on the conditions most conducive to the rapid development of various orders or species of plants, as regards some of the more characteristic manuring elements present in complex manures; and they may lead to a more systematic and certain mode of treatment not only of these but also of other plants as regards manuring.

Some of the manures recommended in the foregoing scheme are known to favour early maturity; it is therefore likely that the experiments will suggest others which may be of much value to fruit-growers.

NOVEMBER 17, 1868.

A. MURRAY, Esq., in the Chair.

The Minutes of the last Meeting were read and confirmed.

A letter from Dr. Chapman, of Abergavenny, was read, relative to the habits of *Platypus cylindrus*, accompanied by specimens of oak bored by the perfect insect. It was conjectured that the larva lived upon moulds developed on the walls of the perforation. Though, however, the walls were certainly covered with mould, it was supposed more probable that the larva was enabled to obtain sustenance from the wood itself. The Secretary was desired to communicate with Dr. Chapman, with a view to obtain specimens for the Entomological Collection.

Two letters from Mr. J. Anderson Henry were read, relative to Mr. Darwin's views respecting heteromorphic unions. He stated that crosses between certain plants were more easily obtained under certain electrical conditions and the presence of ozone, and that the late season had been peculiarly favourable for such investigations. He had obtained crosses this year which he had in vain attempted before. He stated that grafting was sometimes useful in causing a predisposition to crossing, and that seeds obtained from extreme crosses were slow of germination. Dr.

Gilbert suggested that the ozone might be the effect and not the cause, and might only have a relation of coexistence. The Secretary was directed to communicate with Mr. Henry with a view to induce him to undertake experiments.

A conversation then took place respecting the effect of electrical condition on insect life, and the facilities afforded by certain conditions for studying the habits of insects.

Dr. Gilbert laid on the table specimens of the "Red Rust" and "Take All" which have done so much damage in South Australia, of which Mr. Berkeley undertook the examination, and promised to give a report at the ensuing Meeting.

Dr. Voelcker called attention to the bad system of cultivation practised in South Australia, the rotation of crops being often entirely neglected.

A conversation then took place with respect to the effect of Charcoal on Orchids, Mr. Bateman speaking very unfavourably of its use in cultivation, many orchids refusing to grow upon it. Much inconvenience arises from the use of woods which soon decay, the weight, however, of more durable woods being a great objection to their use.

The meeting was then adjourned to the 15th of December, the subject for discussion being the Pruning of Forest Trees.

Extracts of Letters from Mr. J. ANDERSON HENRY.

Hay Lodge, Trinity, Edinburgh,
August 15, 1868.

I early this season set myself to work on various crossing-operations, travelling with some of them into new fields, with a view to report to the Secretary, at the close of the season, what progress I had made. And, as I observe, from a notice just received, there is yet another Meeting to be held (on the 18th) ere the adjournment to November, I embrace the opportunity to intimate, through you, as I am not sure of our Secretary's address, of such being my intention.

I may, for the present, merely mention that I have devoted a great share of my experiments to the genus *Primula*. And, in doing so, I had specially in view the testing of the *dimorphic* law discovered by Mr. Darwin, and trying how far it could be found to extend in accomplishing alliances between various members of that pretty numerous tribe. And if all the seeds I have got ripened and sown from such experiments come true (and I have

taken much care to insure such result), then I expect to show, in a new light, the value of that discovery. In fact, some of the seeds so obtained have already vegetated; and all I can say of them is, that they look or *lie* like truth. But of this hereafter. I have had too many disappointments to be confident of anything, even when the things attempted were much less extreme than those alluded to.

You were kind enough formerly so to express yourself as to some views I had long entertained as to certain effects which I regarded as due to the agency of electricity, that I feel encouraged to suggest that some of those highly scientific Members familiar with the action of that subtle element should follow out experiments to test its influence on plant-life. The views, in a paper of mine, to which you alluded, were, (1.) That I regarded the times and seasons when the atmosphere was charged with that element as most favourable for effecting crosses—crosses, too, which I could not accomplish at other times; (2.) that I held like influences as most favourable for inducing rapid vegetation of seeds. I further held, from repeated observations of the simultaneous vegetation of seeds *long* sown, that such vegetation was due to that atmospheric condition which chemists ascribe to the presence of ozone.

I respectfully submit these matters to the Committee as worthy of investigation.

Be it due to whatever cause, I have, through an experience of at least fifteen years, found certain times and seasons more propitious than others for effecting crosses, especially where the affinity was remote.

And of all the seasons I remember since I first tried my hand that way (and that embraces a quarter of a century), I have found none more favourable than the present for such things. I feel assured you will have extraordinary things reported from those who have been so engaged.

I may only now instance one unusual cross I have effected this season (and that to hang a question on it) a cross which utterly baffled me last year, namely, a cross by *Rhododendron Edgworthii* on *Azalea (Indica) stella*, accomplished by the short pair of anthers, a cross which I last year failed to effect with either the short or the long stamens, though I repeatedly tried on the same plant on which I have effected it this season. And I notice it now less as an extreme cross than as indicative of an influence which I had

never before taken fully into account, but which has now been forced upon my observation by its (supposed) result and analogous things. There may or may not be anything in it; but I humbly submit it as a question to be tested and solved by others, if the Committee deem it worthy of investigation.

Is it possible ultimately to succeed in crosses between species which, at first, resisted such cross, from the persistent act of *inoculation* of the stigma of the one by the pollen of the other?

You may remember noticing in the paper I have referred to (read by me before the Botanical Society of Edinburgh) my intended attempt to accomplish the same end by first ingrafting the one species upon the other, the *Azalea*, say, upon the *Rhododendron*, and thus (the fluids of the stock being infused into the scion) make them of one blood, and, so predisposed, induce a cross of the latter on the former species. But this grafting process would involve a tract of coming time which the experiments which I now proposed will greatly shorten.

At first sight, it may appear that the transfusion of a principle communicated by a few grains of pollen, is utterly inadequate so to affect the seed-bearing plant. But it has been again and again suggested to me by analogous results; *e.g.* I found (as given in an article I wrote some dozen years ago, and quoted by Dr. Lindley in his second edition of 'Theory and Practice') a large portion of the blooms of a *white*-flowered *Calceolaria* became flushed pink from one or two blooms being inoculated with a crimson-coloured variety. I may also allude to the Breadalbane Blotched Ash, communicated by me to Mr. Darwin, and cited in vol. i. p. 394 of his latest work, 'Animals and Plants under Domestication,' and other similar instances there noticed by him of variegation being produced on the stock. These were all, however, cases of *budding* or *grafting*, but to which that of *inoculation* is akin.

Now, ere I close, I may further explain that I made this same Indian *Azalea* (*A. stella*) the subject, last year, of many crosses by different *Rhododendra*, besides *R. Edgeworthii*, two of which only succeeded, namely, crosses by *R. Aucklandii*, of which, I may observe, I pulled the seeds too early, and so have only raised two plants. And here I may observe further, that I have found that the seeds of such extreme crosses take double the time which the normal seeds require to ripen. But it is proper to mention that I observed in the attempted *Edgeworthii*-cross of last year, that from one of the pods so crossed there was a continuous *exudation*

of sap issuing from between the calyx and the abortive pericarp, which last, unlike all the others on the plant, took a pinkish tint.

August 17, 1868.

Referring to my letter of Saturday, the question, I incline to think, should rather be put in this form :—

Between species, though allied, averse, or not hitherto found to unite by crossing, is it possible to effect such a crossing by persistent inoculation from year to year between the same two plants, on the supposition that some principle predisposing to such union is ultimately communicated by the pollen of the male to the seed-bearing plant ?

Or, attending to the circumstances, the Committee may, if they see necessary, improve the question. One test might be to repeat my experiment between *Rhododendron Edgworthii* and *Azalea stella*, making, as I have done, the latter the seed-bearer; for I have never found or known the *Rhododendron Edgworthii* to reciprocate a cross, at least with the smaller species, or, indeed, with any. The experiment may be tried with both *long* and *short* anthers. It is with the *shortest* pair of the *Edgworthii*-stamens, and with them only, that have I succeeded; and by these I have this year successfully fertilized *four* seed-pods, all now beautifully swelled and ripening. I mean next year to repeat the experiment on a plant of *A. stella* not before operated on, again making the trial with *long* and *short* stamens. In place of here repeating my views about these separate stamens, and the use I have made of the short ones over a period of seventeen years, I respectfully refer to p. 5 of the accompanying paper, forming my Presidential Address to the Botanical Society here, on "pure hybridization."

I may be allowed to observe, on the above cross, that as *Azaleas* in general are repellent of crosses by *Rhododendrons*, but more especially by the larger species, to which both the *Edgworthii* and *Bucklandii* belong, it appears to me to illustrate and corroborate my opinions on one of three views alluded to in the accompanying paper, viz. (1) of sympathy, (2) of the efficacy of the *short stamens* of a larger species in accomplishing a cross by their finer-grained pollen on a smaller kindred species, or (3) of *predisposition* effected by repeated inoculation whereby the parents have to some extent become of *one blood*.

I had some other suggestions to offer, but must now defer them. I observe that our friend Mr. Murray alluded, at one of the

Meetings lately, to an experiment I had made with coloured glass in effecting a cross, by which, I believe, I brought out a white from a pale-yellow *Calceolaria*. I am glad to see that some such trials are being made with tinted glass under the auspices of the Committee.

DECEMBER 15, 1868.

A. MURRAY, Esq., in the Chair.

The Minutes of the last Meeting were read and confirmed.

A letter was read from Mr. J. Anderson Henry, in which he stated his consent to comply with the wishes of the Committee in conducting a series of experiments in accordance with the suggestions in his previous communications.

Mr. Berkeley reported on the specimens of Australian wheat placed in his hands.

The rust was evidently the common mildew; and as regards the Take-all, though it appeared very like a case of common blight, there was a clamminess about the specimens which made it possible that they might be affected by the early stage of ergot.

Dr. Masters exhibited a curiously puckered mushroom, which owed its peculiar appearance to the attack of a parasitic *Sphaeria*.

Mr. Andrew Murray read a paper on the Pruning of Forest-trees.

It was suggested that experiments should be made at Chiswick to test the comparative merits of pruning and non-pruning, and that Mr. A. Murray, Dr. Hogg and Mr. Berkeley should be a Subcommittee with a view to inquire into the results of different modes of planting.

Dr. Hogg then made some remarks on the reciprocal action of the graft and scion, the full consideration of the subject, however, being reserved for the next Meeting.

On Pruning Forest-Trees (by A. MURRAY).

A great change has taken place within the last few years in the minds of foresters and others in regard to pruning forest-trees. It used to be held an important part of a forester's duties, and was spoken of as a kind of mystery which required initiation, like astrology. Its high pretensions, however, have been considerably abated; and I believe I may claim some little credit to myself for having helped to bring it about, by writing on the subject.

It still, however, remains an article of faith in a modified degree; and I think it might be of real service to the community if this Committee were to express an opinion upon it, or direct some experiments to be made with the view of settling it by actual trial.

I think the point which the foresters' minds have reached on the subject is this. They have given up the absurd notion they had of pruning the trees with the view of preserving a balance between the roots and the branches; but they adhere to the idea that pruning is of importance to prevent the tree growing to branch instead of growing to stem. And they have an idea that pruning of this kind is to be done by rubbing off the young buds, and nature is so to be kept in order by their precautions.

My opinion is that all pruning is wrong, except as a surgical operation. Where in the human species the knife would be used, as in cancer, or squint, or deformity, or distortion, I would allow the knife also to be used on forest-trees, but never otherwise; and the idea of a man roaming through a plantation and rubbing off young buds, with the intention of preventing erroneous growth in the branches which, in his mind's eye, he may see growing years afterwards from these buds, is, to my mind, too highly absurd to deserve serious answer.

The real point on which the forester requires to be enlightened is the growth of straight timber; and I think there is something still to be learned by ourselves (I mean the theoretical world) regarding it. He wants all the woody fibre deposited in a long straight pole without any branches. Now I believe that the cause which produces a long straight pole is a preponderance of root-fibre over leaves. The experiments of Mr. Herbert Spencer, published in 1866, in the Linnean Society's Transactions, effectually dispelled the old notion that the sap went up one set of tubes and descended by another. It rises and falls in the same tubes, which, in the normal state of things, each terminate in a mouth in the root-fibrils, and in a mouth or mouths in the leaves; and the timber is deposited between and around the tubes by the sap oozing through their walls in its passage up and down; the mouths in the leaves act as suckers to draw up the sap when it is flowing upwards. Now if there were 100 mouths above, dispersed in branches all around the tree, and 100 mouths below, there would be just 100 tubes, and the timber would be deposited in the branches wherever they were; but if we cut off fifty of the leaf-

mouths by taking off side branches to that amount, then fifty of the tubes from the root-mouths have no termination, and they anastomose with the tubes of the other fifty, which then carry so much more sap; as they already deposit as much sap in the shape of timber by exudation through their walls as they can, the additional sap so received by each is carried forward and applied in lengthening the tube, and in depositing timber around such elongation. Now, at first sight, this seems a justification of the forester's plan; but there are divers objections to it. In the first place, the leaves either contribute nourishment to the tree or they do not. If they do, then if we cut off fifty out of our 200 nutrient mouths (that is, 100 root-mouths and 100 leaf-mouths), we obviously sacrifice a fourth of the nourishing power. If, on the contrary, the leaves do not contribute nourishment, but are simply the pistons to pump up the sap, and their other functions are entirely respiratory or excretory, we find that there is still a loss of power: the anastomosing power of the tubes may be insufficient, or other causes, which we do not understand, may operate injuriously; but the fact is undoubted, that when we do cut off the side branches of a tree, the tree suffers; and a very curious thing is, that if we operate so upon an isolated tree, it suffers much more than if it were gradually denuded of its side branches by the natural process of insufficient thinning. I therefore say to the forester, if you will sacrifice deposit of timber to getting a long thin pole, do not attempt it by pruning; but plant thick, and thin little, and allow nature to do it for you. But they won't believe us, and the misfortune is, there is no very good way of convincing them. Both sides have, in the nature of things, to rest their case on prophetic dogmatism. "If you had pruned that tree in time, it would have been much finer," says the one; and "If you had left these trees alone, as I told you, you would not have such a discreditable exhibition of whipping-posts," says the other. But who can prove what would *have been*?

Now I would suggest to the Committee, that they should recommend to the Council to try, by experiment, to show what would have been. Let them plant a few specimen trees as like as possible at Chiswick—the one set to be pruned, the other not. Let a board bearing an explanatory inscription be set up opposite each for the instruction and interest of Fellows; and let photographs of them be taken each year showing their progress. What nothing

else can do, these crucial experiments may—namely, lead the forester and arboriculturist to bury the hatchet.

From the Rev. M. J. BERKELEY to Dr. J. H. GILBERT.

Sibbertoft, Market Harborough,
December 17, 1868.

MY DEAR SIR,—After a careful examination of the specimens of diseased wheat which you have communicated to me at different times from South Australia, I beg leave to report as follows:—

The Red Rust is identical with what is known under that name in this country. The specimens of powder consist almost entirely of what has been called *Uredo linearis*, which is simply the imperfectly developed *Puccinia graminis*, or common wheat-mildew. With this are mixed a few of the obovate bodies which have been considered a distinct species of *Uredo* (*U. rubigo vera*), but which are, in fact, nothing more than the secondary form of fruit which appears to be so constantly developed in different species of *Puccinia*.

Specimens of wheat affected with red rust accompanied the dust, and completely confirmed the opinion which I formed from its examination. The seed itself quite resembles ordinary mildewed wheat as it comes into our markets, except that it is entirely free from *Cladosporium herbarum*, which is so often developed on the tags in this country, or from any other dark-coloured mould, a circumstance which doubtless arises from some different condition of climate which prevails after the mildew has been fully established, from what we ourselves experience in bad mildew years.

I believe that no chemical treatment is of the slightest use in mildew, analogous to what is constantly successfully practised in the case of bunt (*Tilletia*)—which is often confounded with smut (*Ustilago*), a very different thing, and which, apart from other characters, is at once known by its nauseous fish-like smell.

Of the three samples of "Take-all" transmitted to me, the second is undoubtedly nothing more than common wheat-mildew; and I shall therefore confine my observations to that received originally, and a third transmitted to me from the Bank of South Australia by yesterday's post, and which is identical with the first specimens which I examined. The first impression was, that it was a mere case of blight arising from imperfect cultivation in overworked land without any attention to rotation of crops, and

often in soil wholly unfit for the purpose. It is, however, stated that it occurs under other circumstances; and perhaps the following remarks may lead to something more definite on the subject, though, from the paucity of specimens laid before me, and the impossibility of examining the disease *in situ*, I can throw out little more than suggestions for future examination.

On close inspection, under a common lens, you will observe that, at the point where the glumes are attached to the rachis there is a red transparent spot, which seems to be constant in the specimens before me; while in those cases where the young seed has been arrested in its growth before impregnation had been perfected there is a similar condition. I find at those points a very minute fungus, which may be merely an early stage of the *Aspergillus* with which the specimens are covered—but which, on the other hand, may be quite independent of it. I observe a certain degree of clamminess about the sheaths of the inflorescence, and certainly, on examining the surface, I find something closely resembling the production which Mr. Queckett called *Ergotetia abortifaciens*; but the specimens are so universally powdered with the spores of the *Aspergillus*, which notoriously vary greatly in form, that it is impossible to be certain as to their real nature. The clamminess may be entirely accidental; and if there were universally a sugary exudation such as accompanies the early stage of Ergot it could scarcely be overlooked; added to which, we have no evidence to show that wheat is subject to Ergot in Australia, though this is much more frequently the case in this country than is generally suspected; I have seldom, indeed, examined a miller's hopper without finding ergoted grains. At any rate the attention of cultivators should be called to this point in Australia, as it is one of considerable importance; and if the clamminess really exists, well-selected specimens should be carefully dried, so as to leave the exudation upon them, and at once transmitted to this country for examination, if there is no one competent in Australia to give a decided opinion.

Mr. Ey is quite right as to the evidence he gave about rust; but that relative to "take-all" is absurd. He can never have seen the *Vibrio* of wheat, or he could not have made the statement he does.

The "Drake," which accompanied the mildewed wheat, is the common darnel, *Lolium temulentum*.

I am, very truly yours,

M. J. BERKELEY.

P.S. Since examining the sheaths, in a grain of wheat from the "Take-all" (which showed in the furrow somewhat of the same red transparent appearance), after maceration and removal of the outer skin, where none of the *Aspergillus* could be present I find a number of delicate threads which are in all probability the mycelium of some fungus. This is certainly a point which ought to be taken into consideration together with the presence of fungous matter as observed above on the rachis, at the point of junction of the glumes.

Report on "Red Rust" and "Take-all" affecting Wheat and other Crops in South Australia.

To the Directors of the South Australian Company.

GENTLEMEN,—From a careful consideration of the Report of the Commission appointed to inquire into, and report upon the diseases in Cereals, and also of the minutes of evidence taken, it would appear that wheat and other crops grown in the Colony have suffered very materially from at least two distinct affections—the "Red-rust," and the so-called "Take-all."

The "Red Rust."

This affection appears to have been very prevalent throughout the Colony in the year 1867, and to have caused immense damage to the wheat-crops. Red rust is a well-known fungoid growth; and, as will be seen by reference to the letter appended hereto, from the Rev. M. J. Berkeley, who is one of the best authorities on such subjects in Great Britain, the evidence as to its identity and characters, given by scientific witnesses in the Colony is fully confirmed by that gentleman. It is one peculiarity of red rust that its development is dependent on certain favourable conditions of temperature and moisture, and that when these occur it increases with extraordinary rapidity.

From the tables of rainfall at various places in South Australia in 1867, it would appear that the months of September and October were unusually wet—the rain-fall being in some instances double, and in others more than double, the average of the districts in question. It would further appear that the rain did not fall for the most part in heavy showers, leaving intervals during which the soil and plant could become relieved of super-

fluous moisture, but, on the contrary, that it fell almost continuously. By way of illustration of this, it may be cited that there were in one district :—

In September twenty-six rainy days, and four fine days.

In October twenty-three rainy days, and eight fine days.

The plants would therefore be constantly surrounded by a moist atmosphere, which, together with the conditions and changes of temperature also recorded, would supply the atmospheric conditions peculiarly suitable for the development and extension of the fungus. In fact it may be safely assumed that, if similar conditions of temperature and moisture were again to prevail in the colony, the wheat-crop would again suffer most seriously, as, indeed, it would, under similar circumstances, in Great Britain or elsewhere.

The evidence submitted to the Commission, conclusively shows that the extensive development of red rust, with the consequent injury to the wheat-crop, were not attributable to exhaustion of the soil. The fungus would, in fact, be likely to increase more rapidly, and to be the more destructive, the more luxuriant, and therefore the taller and the more bulky, the crop, as the plants would then stand thicker on the land, and in a greater degree prevent the free circulation of air among the stems and leaves. The extensive development of the parasite is essentially due to atmospheric circumstances, and is only in a secondary degree connected with the character of growth of the wheat-plant itself, as affected by the condition of the soil as to exhaustion, manuring, &c. Indeed, in a fertile condition of the soil, which would give the most luxuriant and healthy crop, provided the season were favourable, the healthy growth of the plant would be the most endangered under those climatic circumstances which are the most favourable to the spread of red rust, and the crop would therefore be the more likely to suffer injury from it when once attacked. It is useless, therefore, to seek for a remedy in high manuring.

So little does the exhaustion of the soil of itself render the wheat-plant more subject to injury from parasitic growth, that wheat has been grown on a portion of a field on this farm, at Rothamsted, for twenty-five years in succession, both corn and straw being taken from the land every year, and no manure of any kind returned to it; and although the produce has not averaged one half that obtained on some of the manured portions

in the same field, the plants have been as free from injury by parasitic growth as on any other part of the same field, or, indeed, of the whole farm.

Whilst it may be assumed that, under favourable atmospheric conditions, red rust may prevail at once on the most fertile and on the most impoverished soil, there is abundant evidence that different descriptions of wheat may be affected in very different degrees. Great attention should therefore be devoted to the selection and acclimatization of those descriptions which experience has shown to resist the most effectually the development and extension of this destructive parasitic growth. In England it is well known to be necessary to exercise much caution in sowing wheat which has been grown in a warmer climate. Many years ago a field on this farm was sown with seed grown in the Island of Jersey, by Colonel Le Couteur, who was at that time celebrated for his fine qualities of wheat. The plant grew beautifully up to the time of blooming; but subsequently the crop was almost completely destroyed by red rust, whilst the descriptions of wheat usually grown on the farm suffered no injury.

It is probable that in the selection of seed-wheat for Australia, it would be desirable to look to the produce of countries where the average temperature of the growing and ripening period is as high or even higher than in Australia, and the rainfall at the same time considerable. Probably some parts of the United States, where wheat grows side by side with more tropical products, might furnish a seed easy of acclimatization, and well calculated to withstand parasitic growth. Experience alone, however, can show whether seed so selected, or that from more temperate climates, will yield a plant the most capable of resisting the ravages of red rust under the particular climatic conditions of the Colony.

"Take-all."

The evidence taken and the Reports of the Commissioners show that the affection to which this expressive name is applied has not been so carefully studied, nor is so well understood, as the red rust. The evidence given respecting it is indeed very conflicting. It will be seen, by reference to the letter of the Rev. M. J. Berkeley, already referred to, that, so far as he is enabled to judge from the examination of the very imperfect specimens which were supplied to him, he comes to the conclusion

that the plants were certainly affected by a parasitic fungus. His remarks show, however, that more complete specimens and a more thorough examination are required before a confident opinion as to the exact nature and circumstances of development of the fungus can be formed.

It would appear that there is a very material and formidable distinction between Red Rust and Take-all. Whilst Red Rust is only developed to any serious extent where there is a coincidence in the conditions as to temperature and moisture such as is very unusual in South Australia, Take-all, on the other hand, appears to flourish under as wide a range of circumstances as to soil, and a much wider range as to climate. It is described as attacking several descriptions of crops. And, again, although attributed by some to exhaustion of the soil, the evidence goes to show that it occurs on the more as well as on the less fertile soils, and on newly broken-up as well as on exhausted land.

Assuming the injury to be due to the rapid growth of a parasitic fungus, extending its ravages from a centre to everything within its reach, and under a much wider range of circumstances than the red rust, it is obvious that it is much more formidable, and that its progress should be arrested by very vigorous means. As was necessary with the cattle-plague in England, it should be stamped out. Some of the witnesses before the Commission advocated the burning of the stubble as a means of destroying the germs of future growth. The use of flowers-of-sulphur dusted over the affected spots has also been recommended; and this might be tried; but it is doubtful whether any such means would suffice when the affection has made much progress. Probably the best and safest plan would be to attempt to arrest the disease in its earliest stages, by cutting down and burning the affected portions or by the use of quicklime wherever, and as soon as, it makes its appearance.

A review of the evidence available on the subject seems to justify the following conclusions:

1. That Red Rust is a parasitic fungus which is only developed to any serious extent under special atmospheric conditions in regard to heat and moisture.
2. That luxuriant crops, growing on fertile soils, are as liable to the attacks of Red Rust as poor crops growing on exhausted soils.
3. That some descriptions of wheat are much more subject to injury from Red Rust than others.

4. That great attention should be paid to the selection and acclimatization of wheat, by which means, more than by any other, it is probable that the crop will be rendered capable of better resisting the ravages of the fungus.

5. That, to this end, trials should be made of seed-wheat from various countries and climates.

6. That the so-called "Take-all" is also a parasitic fungus, the exact nature of which is, as yet, not satisfactorily determined.

7. That "Take-all" appears to develop and spread under a wide range of conditions as to soil, and a much wider range as to season; than the Red Rust.

8. That, inasmuch as the "Take-all" appears to flourish on other descriptions of plants besides cereals, and the analysis of the soils from some districts where it has prevailed show great poverty, and it is understood that its ravages have been peculiarly severe on some wet lands, it would seem probable that keeping the land free from weeds and well drained might at any rate remove some of the conditions favourable for its rapid development.

9. That, so far as existing knowledge goes, the only safe mode of dealing with actual attacks of the "Take-all" is to stamp it out. This may be accomplished by destroying the affected portions of the crop by burning, or by quicklime, as soon as it appears, and so prevent its further spread.

10. It is very desirable that the early stages and the conditions and progress of development of the "Take-all" should be carefully investigated and reported upon, and that specimens should be collected, *in situ*, in the different stages, carefully preserved so as to retain their special characters, and both reports and specimens forwarded to this country for further examination, provided any doubt still remains after due investigation in the Colony.

(Signed) { J. B. LAWES.
J. H. GILBERT.

Rothamsted, Herts,
Dec. 24, 1868.

REPORT TO THE COUNCIL FROM THE CHISWICK
BOARD OF DIRECTORS.

February, 1869.

1. The Directors report that, besides the work performed by the Fruit Committee at its ordinary meetings held at South Kensington, several experiments have been conducted at Chiswick under its immediate supervision. All the new Peas that were introduced last season were sown, and compared with the previously existing varieties; a collection of thirty sorts of Runner Beans was also sown and proved; and a test of the various kinds of Lettuce, as to their utility in standing the winter in the open air. Reports upon all of these subjects have been prepared.

2. Among Fruits, Figs and Strawberries have received special attention. The house which was transferred from South Kensington for the accommodation of the former has proved in every way well adapted for the purpose, and has enabled the Committee to investigate the rich collection which the Society now possesses in a way for which there was no previous provision. Several new and valuable varieties of Figs have thus been ascertained, and are now in the course of distribution to the Fellows; and it may be gratifying to the Council to know that, by the assistance thus afforded, a great impulse has been given to fig-culture in this country, which is evidenced by the unusually numerous applications which have been made for cuttings.

3. An immense collection of Strawberries now exists in the Garden; and during the past season many new varieties have fruited, and have been compared with the others, their various qualities and merits ascertained, and a Report has been prepared.

Arrangements have this season been made for carrying out experiments on the influence of the stock on the scion, and *vice versa*, which it is hoped may lead to important results by the investigation of the affinities of vegetable tissues. These experiments will not be confined to the scions and stocks at present in ordinary use, but will embrace subjects the union of which with each other has never before been attempted.

4. The cultivation of Oranges has recently received some attention, and promises to become general in all gardens where glass houses exist. The success which has already attended those who have made the experiment of growing oranges, not for orna-

ment as formerly, but for the dessert, has been so great that the Board of Directors would recommend to the Council to institute a system of orange-culture at Chiswick. There are at present no less than three houses devoted exclusively to stove-plants, one of which might be spared for this purpose, and thereby enable the Society to exhibit to the Fellows, and horticulturists generally, the pleasure and profit to be derived from this hitherto neglected branch of fruit-culture.

5. The new Orchard House, to the erection of which the Council gave their sanction last year, is now completed, and will speedily be furnished with complete collections of Peaches and Nectarines, Apricots, and Cherries. These three kinds of fruit are what the Directors have thought proper to select for the first investigation; and for this end, as complete collections as possible of these have been obtained. Mr. Rivers, of Sawbridge-worth, has offered a large number of his fruiting peaches and nectarines (most of which are newly raised seedlings of his own) on terms so liberal as to amount almost to a gift. The Rev. W. Kingsley, of South Kilvington, has most liberally presented a large collection of carefully hybridized seedlings of Peaches and Nectarines, which have not yet fruited, but from which there is every reason to expect varieties of great excellence, when the care and judgment with which the hybridization was conducted are considered. Mr. Pearson, of Chilwell, near Nottingham, has also intimated his intention to send some of the handsome orchard-house trees for which his establishment is noted.

6. From the Pomological Department the distributions have been very numerous, 1700 packets of fruit-tree cuttings of Apples, Pears, Vines, Figs, &c., and 75,000 packets of vegetable seeds, having been distributed among the Fellows in the past season.

7. The Directors are making the most earnest exertions in carrying out the recommendations of the Scientific Committee, on the result of which they hope to be able to report another season.

8. The usual attention has been given to the supply of plants both for outdoor and indoor decoration at South Kensington; to the distribution among the Fellows of plants, seeds, and cuttings; and to the growth, for the use of the Floral Committee, of plants and seeds for trial.

9. The number of flowering and other plants which have thus

been supplied during the past year to the Garden at South Kensington amounts to 53,000. In addition to these, there have also been reared at Chiswick a fine stock of stove and greenhouse foliage and flowering plants, which prove exceedingly useful both for the purpose of conservatory decoration and for supplementing the display at the Tuesday and other meetings, when required.

10. The distributions of plants, seeds, &c. which have been made to Fellows, and to Societies in union, absorb a considerable portion of the grant for Chiswick. In the present instance 5572 plants, which have been allotted by ballot, have been sent out during the season, in addition to 1000 packets of cuttings and 75,000 packets of flower-seeds.

11. The trial plants have consisted mainly of Pelargoniums, Fuchsias and Petunias, with some annuals. Of these the collections which have been subjected to pot culture were very successfully tested, taking the extraordinary character of the past summer into account. The hot, dry weather, however, on the other hand, was very unfavourable to the much larger outdoor stock; notwithstanding which, in this department, some very satisfactory results have been obtained, a separate Report of which has been prepared.

12. In carrying out the trials of new varieties of popular flowers, the collections of which, grown for contrast, continue to prove of much interest and value to persons residing in distant parts of the country and who have but few opportunities of seeing the novelties annually produced, the Directors hope to receive, as hitherto, the hearty support of the raisers and distributors of novel varieties. They would take this occasion to point out how desirable it is that well-established plants should be furnished early in the season, so that the experiments may not fail, as they too often do, from the weakly condition of the materials with which the Garden-Superintendent is supplied.

13. Last year occasion was taken to ask the assistance of Fellows residing in the country in making up a collection of the most interesting, but greatly neglected, class of hardy herbaceous plants. Contributions were, in consequence, received from W. W. Saunders, Esq., Messrs. Backhouse & Son, Mr. W. Masters, Mr. Ware, the Royal Gardens, Kew, and from some other sources, so that a collection of upwards of 400 species and varieties has been made. Fewer of the old-fashioned ornamental species, which it

was thought might still exist in gardens in remote parts of the country, have been received than were expected; but the Directors are not without hope that more of these may yet be obtained. Among other specialities, a complete collection of *Liliums* has been projected, and the Directors are glad to be able to report that 102 kinds, including species and varieties, have already been secured. Any further contributions to either of the foregoing collections will be gladly received.

14. Under the head of improvements, the Directors have to report the erection of a new spacious Propagating-Pit, and the alteration and more convenient arrangement of some of the other structures used for stove plants. Besides these, the old curvilinear iron stove has been rendered very much more useful for cultural purposes, by having a glass division fixed in the centre.

15. Very satisfactory progress has been made in the raising of new plants by cross-breeding. The Directors, last year, had to report that some Golden *Caladiums* had been obtained, the first that were known to exist. These have proved to be very ornamental plants for spring and autumn growth, and will probably be distributed in the ensuing season. The *Coleuses* mentioned last year have also occupied a prominent position; and it is a source of satisfaction that a set of Golden *Coleuses*, much more beautiful than the first series, has since been obtained. Other hybrid acquisitions of the year are a new spotted *Dieffenbachia* (a hybrid between *D. picta* and *D. Weirii*), a very fine Golden *Fuchsia*, and several choice variegated zonal and gold and bronze zonal *Pelargoniums*.

Floral Committee.—Jan. 19, 1869.—A Second-Class Certificate was awarded to a curious unnamed *Oncidium*, from Lord Londesborough, purchased as *O. nebulosum*, but apparently nearly allied to *O. sphacelatum*. A First-Class Certificate was given to a dwarf-tufted *Asplenium*, allied to *A. erectum*; also to W. Wilson Saunders, Esq., for *Agave Besseriiana hystrix*.

Fruit Committee.—A First-Class Certificate was given to a very pretty pear-shaped yellow Gourd, sent by Mr. E. G. Henderson, belonging to the race known in France under the name of *Coloquinelles*.

SCIENTIFIC COMMITTEE.

JANUARY 10, 1869.

W. W. SAUNDERS, F.R.S., in the Chair.

The Minutes of the last Meeting were read and confirmed.

The Rev. M. J. Berkeley exhibited a seedling *Pelargonium*, which had been sent from Southampton, in which a multitude of adventitious rootlets had been developed from the base of the stem, some of which were some inches in length, and hung over the sides of the pot. Specimens of the fibres, as originally developed, were exhibited, and attention was called to the new growth. Mr. Berkeley was directed to obtain information as to the circumstances under which they appeared—whether, for example, moss or cocoa-fibre had been placed at the top of the pot; but no answer has been received.

Mr. Berkeley next called attention to an Orchid-shoot of an infected plant, in which a quantity of insects, presumed to be Hymenopterous, had been developed.

Mr. Horne stated that a similar condition sometimes existed in India in Liliaceous plants. The specimens were forwarded to Prof. Westwood.

Dr. Hogg then exhibited a quantity of Apple and Peach stocks from Mr. Rivers, a detailed account of which will appear in the report appended to these minutes.

Dr. Masters then exhibited, on the part of Mr. Scott, of Merriot, specimens of Crab and English Paradise stocks, injured by frost in 1867, as also of *Pommier de Paradis*, growing in the same soil and of the same age as the English Paradise.

The whole were sent to Chiswick, and a report from Mr. Barron will be read at the next Scientific Meeting.

Dr. Masters brought fasciated branches of Sycamore, stating that the phenomena arose probably from a quantity of adventitious buds being produced in consequence of some injury to the terminal bud.

Mr. Berkeley stated that in Canada fasciated shoots are produced in a species of Elder by *Æcidium sambuci atrum*, Schweinitz.

Dr. Masters also brought a sprig of Holly from Mr. Fish, in which the berries, which are usually of a yellow colour, showed a tint of bright orange-red, the tint being supposed to arise from

its being grafted on a red-berried Holly. It was, however, thought possible that the change might have been effected by the contact of pollen from the red-berried form.

Mr. Miers exhibited an imported specimen of *Oncidium cecbolleta*, sprinkled with black specks.

Apple-trees and Stocks to be submitted to the notice of the Scientific Committee at South Kensington, January 19, 1869.

Group 1.—Apples on the Nonesuch English Paradise stock, with two stocks one year old. The trees are one and two years old, with the exception of the dwarf bushes, which are two and three years old; this stock was raised here from the Nonesuch Apple some thirty odd years ago.

Group 2.—Apples on the Broad-leaved English Paradise stock, with two stocks one year old. The trees are one and two years old. This stock was raised from seed the same season as the above, its parentage unknown. Both these stocks are remarkable for their rooting freely at the surface, and giving a robust growth with great fertility.

Group 3.—Apples on the French Doucin-stock, one and two years old, the best variety received from France. This kind does not root so freely near the surface in this climate as the English Paradise stocks. Two stocks, one and two years old, are sent with the trees.

Group 4.—Apples on the French Paradise stock, one and two years old, with two stocks one year old. The trees on this stock are very fertile, but are apt to canker in the stiff cold loams of this place.

Two Peach-trees, Bellegarde and Grosse Mignonne, early, budded on a kind of White Magnum-Bonum plum. The "French Peaches" were formerly budded on the White-Pear-plum and the Brompton-plum stocks. In France, at the present day, they are budded on the Black-Damask and the Mirabeau-plum stocks with no great success, as the stocks do not swell freely.

The stock now sent swells with the scion, and seems likely to supersede all other kinds of plum-stocks for the French Peaches.

STOCKS.

One Burr-knob, a surface-rooting Apple, forming a very good stock for garden Apple-trees. Two Pigmy Paradise stocks, one year old. Two Miniature Paradise stocks, one year old. These

are sent to show the tendency of our old kinds of apples to produce from seed surface-rooting dwarf trees; they have not yet been employed as stocks to graft apples on, owing to their feeble growth; they were raised here from seeds some years since.

One lateral single Cordon Apple-tree on the English Paradise stock, five years old.

One vertical Cordon Apple-tree on the same kind of stock, and of the same age.

One lateral single Cordon Apple-tree on the French Paradise stock, five years old, an imported tree from France; the three last-mentioned trees have been growing side by side in a stiff cold clayey soil.

The trees, after examination, to be sent to the garden at Chiswick, if agreeable to the Committee.

*Royal Horticultural Society's Gardens, Chiswick,
February 10, 1869.*

The fruit-tree stocks which were submitted for the opinion of the Scientific Committee at its last Meeting by Mr. Rivers, Mr. Scott, of Crewkerne, and Mr. Meston, having been sent down to Chiswick, to be there tested comparatively, I have thus had a good opportunity of examining them, and noting the differences amongst them, as well as of comparing them with those which have been used in the gardens of the Society.

Without attempting to decide who is right or who is wrong in this discussion, or even to pass a single opinion on their respective merits, I shall merely, having a few facts to communicate, submit the same to your notice, as possibly they may prove of some little interest.

In an old numerical list of the orchard trees in the Society's garden, Chiswick, in Dr. Lindley's writing, dated 1822, the stocks on which the various apples are worked are stated, viz. the Crab, the Doucin, the English Paradise and the French Paradise; many of the identical examples given still exist in the gardens, and all have formed large orchard trees. Those on the Crab and Doucin have formed considerably larger heads and trunks than those on the English and French Paradise, which are as nearly as possible equal, some of the latter, however, are fully six inches in diameter. All of them are of about equal fertility; but in the case of those on the French Paradise there is ap-

parent a greater tendency to canker than on either of the others. I have obtained suckers from each, which I shall plant for comparison with the new examples. I may state that the suckers of the French Paradise appear to me identical with those in dispute, as exhibited by Mr. Rivers and Mr. Meston, which are decidedly the same the one as the other. I have compared each example with those of the Pommier de Paradis, as received from Messieurs André Leroy, of Angers, which we have been using in the gardens for the last eight or ten years, and am prepared to state that they are all identical. The French Paradise, where it grows at all vigorously, is easily recognized by its reddish brown bark, and the peculiar bulging at the base of the buds on the stem, as shown by the examples produced; in weak examples this is not so apparent.

Example no. 1 is the French Paradise, 1^{re} choix, as imported.

Example no. 2 is the French Paradise, 2^{me} choix, planted and grown twelve months in the garden.

Examples no. 3 are apples grafted on stocks similar to no. 1, well established when grafted and growing in wet clayey soil. These have not been transplanted or root-pruned for three years.

Examples no. 4 are apples grafted on stocks similar to no. 2, not established in the ground when grafted.

The examples are all fairly selected out of some hundreds similar growing in the garden.

The Pommier de Paradis of Mr. Scott, of Crewkerne, appears distinct from all the others, the shoots being of a lightish brown colour and downy. The climate of Somersetshire may have, however, altered them considerably; their identity remains to be proved.

A tree—the identical tree (as I have been informed by Mr. Thompson) of the Dwarf Apple of Armenia which was sent home to the Society by the late Mr. Barker, noticed in the Horticultural Society's Transactions, who was for many years British Consul in the East, and to whom also we are indebted for the Stanwick Nectarine and many other fruits—still exists in the Gardens. It is in a very healthy state, and will this season produce blossoms, if not fruit. It is growing in very poor soil, and until last spring was much neglected and smothered up with other trees, so that it has not had so fair a chance of developing itself as it should have had. The stem is about the thickness of one's arm, and the tree about 10 or 12 feet high, and as much in

diameter. Mr. Thompson always considered it identical with the French Paradise; and no man has had a better opportunity of examining them and arriving at a conclusion. It appears to me slightly different from the French Paradise of Leroy, and more nearly resembling that of Mr. Scott. They have been grown under very dissimilar conditions, however, so that that point cannot be settled.

None of the stocks used in the Society's Gardens have ever suffered and been injured by frost in the manner of those of the English Paradise exhibited by Mr. Scott, which were very much cankered; and the French Paradise seems to succeed best in the wet clayey soils, as exemplified by No. 3. I have never seen the slightest tendency to canker, excepting with the trees now nearly fifty years of age.

The Pigmy and Miniature Paradise stocks of Mr. Rivers cannot be distinguished from weak examples of the true French Paradise.

The grafted examples exhibited by Mr. Rivers on the Nonesuch English Paradise and the Broad-leaved English Paradise, were very excellent, about similar in vigour to those on the French Paradise exhibited by Mr. Meston, and also in their rooting-properties. Those on the French Doucin in both lots were stronger and not so fibry-rooted as the three former. Mr. Rivers's examples on the French Paradise are weak and wanting in vigour, about equal to those of No. 2 from the Society's Gardens.

All of the examples exhibited supported the statements made by the parties interested. It is, however, an easy matter with such things as Apple-stocks, in which there is so much variation in respect to health, vigour, &c., and even of the different growths of the Apples worked upon them, to select examples to uphold any opinion that may be given respecting them. A true knowledge of their respective merits can only be obtained by direct comparisons; and now that all these may be seen growing side by side in the Society's Garden, any one may examine them for himself, and draw his own conclusions therefrom.

A. F. BARRON.

GENERAL MEETING.

J. BATEMAN, Esq., F.R.S., in the Chair.

The Rev. J. Dix read a list of the awards of the Floral Committee, and called special attention to a box of Camellia-flowers sent from Her Majesty's garden at Osborne, with photographs of the trees from which they were gathered. They were remarkable as produced in the open air at so early a period in the season. He also pointed out two fine specimens of *Senecio Ghiesbreghtii*, which had done service at Battersea, and were now in full bloom.

Mr. G. F. Wilson reported the awards of the Fruit Committee, and highly commended the little self-coloured Gourd as a pretty ornament for the dessert.

Mr. Berkeley directed attention to Naudin's Memoir on Gourds, in vol. vi. ser. 4, of the 'Annales des Sciences Naturelles,' as the best source of information respecting the species and varieties.

Mr. Jenner had sent to Chiswick a plant of the hybrid Thistle, between *Carduus palustris* and *C. heterophyllus*, detected in Scotland.

Some Peach-shoots from Lord Winchelsea's were exhibited, whose tips, and sometimes the middle of the shoots, were dead or dying; and Mr. Berkeley attributed the disease to copious moisture following excessive drought.

Diseased roots of the Telegraph Cucumber were then pointed out, which were covered with Truffle-like excrescences, which, from their peculiar structure, he believed to arise from a minute *Vibrio*, probably identical with that which produces a similar disease in Melons.

The Pelargonium of which a notice is given in the Minutes of the Scientific Committee, was also placed before the Meeting.

The Chairman then made some observations on the collection above mentioned of Camellia-flowers, on the propriety of again trying *Oxalis crenata* as a culinary plant, on the profusion of Truffles in the past season in France, and then commented on the different Orchids in the room.

Mr. Berkeley stated that there are about forty species of Truffles in England, and recommended those who wished to preserve the full aroma of our chief esculent species (*Tuber aestivum*) to bake it in wood-ashes, like potatoes.

Floral Committee.—Feb. 16, 1868.—First-Class Certificates were given to *Cypripedium Harrisianum*, a hybrid between *C. villosum* and *C. barbatum*, raised by Mr. Dominey; to *Dendrobium crassinodum* and *lasioglossum*, from Mr. Veitch; to *Phormium Colensoi* and *La Maestosa Camellia*, of a carmine tint, spotted with white, from Mr. Bull and the Baroness Rothschild *Coleus*, one of the varieties raised at Chiswick, from Messrs. Downie, Laird, and Laing. First-Class Certificates were also awarded to several varieties of Chinese Primrose from various establishments.

Fruit Committee.—There was a wonderful display of Apples, whose high state of preservation excited so much admiration that the parties from whom they were sent were requested to send some information as to the method of keeping. Answers from all were received, of which a *précis* will be given hereafter.

In the list of prizes offered in 1868 two have been accidentally omitted, viz. Mrs. Lloyd Wynne, £3 3s., Lady Dorothy Nevil, £2 2s., for the two best collections of British esculent and deleterious Fungi.

SCIENTIFIC MEETING.

FEBRUARY 16, 1869.

W. W. SAUNDERS, Esq., F.R.S., in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Berkeley stated that in an additional specimen of diseased Telegraph Cucumber he had found abundant Vibrios, together with eggs. Every plant was either dead or dying.

A report was read from Mr. Barron on the different stocks sent down to Chiswick, which is given above.

A plant of the Robert-Steiger Hyacinth was exhibited by the Chairman, in which all the petals were green instead of bright carmine, the form also of the flowers being much altered, and the flowers themselves erect. A trace of the original colour was visible in the stamens, while the flower-stalks were of a dark red. It had been submitted to no particular treatment. Mr. Saunders called attention to the green tips which so often exist on the

divisions of the corolla; and Mr. Berkeley reminded the Committee of a similar condition which occurs occasionally in *Colchicum*, and which is figured in 'English Botany.' Dr. Masters alluded to a like phenomenon in the Lily of the Valley.

Mr. Berkeley then produced a plant of *Abutilon Thompsoni variegatum*, from Messrs. Henderson, grafted on *A. striatum*, which had variegated the stock both above and below the graft, a case exactly analogous to the often quoted influence of the variegated Jasmine on a self-coloured stock. Dr. Masters stated, on the authority of Mr. Fortune, that *A. striatum* sometimes produced variegated shoots.

It was considered desirable that experiments should be made at Chiswick.

The Chairman produced a series of leaves of *Cyclamen Europæum* from Corfu, showing every intermediate stage between even-edged and hederaceous leaves. He considered it the same with *C. Africanum*. Mr. Munby suggested it might be *C. hederæfolium*; but the question arises whether that is really different from *C. Europæum*.

Professor Westwood reported on the insects contained in Orchid buds which were exhibited at the previous Meeting. The bud submitted to him contained two species of Hymenoptera of the genus *Eurytoma* in the pupa state. An American entomologist, Dr. Thaddeus Harris, had found on wheat-ears one species of the genus which he had never found parasitic; and we have here another species, if not two, with an exceptional habit, in a genus formerly supposed to be entirely parasitic.

Dr. Masters exhibited a plant of Mistletoe with both male and female fructification, a circumstance which had not been observed before in the Mistletoe, though not uncommon in *Loranthus*. It was quite clear, on examination, that the exception was not due to the germination of a male seed on a female plant.

Major Clarke compared it with the well-known case of the Hautbois Strawberry.

Dr. Masters then gave the substance of a paper by Mr. Taylor on grafting Potatoes, and its extraordinary effect in producing new forms. The paper will appear in extenso in the 'Gardeners' Chronicle.'

Major Clarke directed attention to the variability of the Potato under different circumstances, and thought that this might have something to do with Mr. Taylor's experiment. The subject,

however, was recommended to the attention of the Board of Directors at Chiswick.

The Meeting then adjourned.

GENERAL MEETING.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

The awards were reported by the Rev. J. Dix and Mr. Wilson, the former of whom called especial attention to some enamelled labels, and the latter, after noticing Mr. Rivers's magnificent display of apples, was requested to obtain information as to their mode of preservation.

Mr. Berkeley, after noticing the novelties which had been brought before the Floral Committee, called attention to *Spiræa Thunbergii*, together with *Hoteja Japonica*, as an elegant ornament of the conservatory in spring, and which is, moreover, perfectly hardy, and to some specimens of *Prunus myrobalanus* and *Pyrus sinensis* from the Chiswick Gardens, where they were in full beauty. The fruit of a *Solanum* was sent under the name of *Solanum guisardos*, or culinary *Solanum*, from Lord Carrington's, which proves to be *Solanum betaceum*, Cav., a species now referred to the genus *Cyphomandra*, which differs from *Solanum* merely in having the connective of the anther-cells gibbous and conspicuous. Specimens of the Wild Cabbage, from Llandudno, were identical with others from Gwrwch Castle, which Mr. Berkeley had cultivated for five generations, and which exhibited the Kale type. It appeared that he was wrong in supposing the disease in peach-shoots, noticed at a former Meeting, to have been caused by extreme changes of weather, as it has appeared for several successive years. It is probable, therefore, that some peculiarity of soil is the cause of the malady. Allusion was then made to a vine whose roots had been attacked by *mycelium*; a generous top-dressing was applied, which had induced a growth of new roots in the fresh soil; but, notwithstanding, it could not effectually resist the injurious action of the fungus-spawn. Mr. Berkeley promised to report on several forms of *Phormium* which were placed before the Floral Committee, about the nomenclature of which there was some doubt.

With reference to this, the Chairman stated that there were two or three distinct forms of *Phormium tenax*.

He then pointed out specimens of *Pelargonium triste*, *P. flavum*, and *P. filipenduliforme* as elegant ornaments of the conservatory, when allowed to hang down gracefully from baskets, and thought that florists might take a new start in hybridizing. The Cabbage of the Kentish coast was distinct from the specimen exhibited from Wales, and approached more the type of the common Cabbage.

Major Trevor Clarke produced a specimen of *Pelargonium fulgidum*, which was the source of most of our fine garden Pelargonias, and showed that much patience was necessary in producing fine forms from hybridizing, as the first results were often very unpromising. He then exhibited a fine golden-leaved variety of Holly, which proved constant from seed.

The Meeting then adjourned.

Floral Committee.—First-Class Certificates were awarded to a beautiful variety of *Thuja gigantea* blotched with yellow patches, from Messrs. J. and C. Lee; to *Phormium tenax*, variety *Veitchii*, a rigid erect-leaved form, elegantly streaked with lines or bands of creamy white; to *Odontoglossum triumphans Marshalli*, from Mr. Wilson, gardener to W. Marshall, Esq., a very handsome Orchid from New Granada, having the yellow sepals and petals thickly blotched with cinnamon brown, the lip white, with a frilled yellow margin and cinnamon-brown tip; to *O. triumphans Wilsoni*, from Mr. Wilson, having polished instead of wrinkled pseudobulbs; to *Todea hymenophylloides compacta*, from Messrs. Standish, densely tufted with a thick caudex, a variety which comes up in great abundance in the houses at Ascot; to *Bletia Sherrattiana*, from Mr. Sherratt, gardener to J. Bateman, Esq., and to *Ipsea speciosa* from the same collection; also to the *Duke-of-Edinburgh Rose*, from Messrs. Paul and Son, an English seedling with handsome cupped flowers of a rich-shaded crimson-scarlet.

Fruit Committee.—Three bunches of *Seedling Grape*, "*Thomson's White Lady Downes*" (a seedling from Lady Downes crossed with Bowood Muscat), were much admired; but the flavour was impaired by the unusual heat of February stimulating the sap too early. It is hoped that it will be seen next year in a condition which will fully justify the high commendation it has received from those who have had an opportunity of seeing it when in perfection.

SCIENTIFIC MEETING.

MARCH 2, 1869.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

Mr. Berkeley exhibited a curious form of *Dædalea quercina*, which had been sent to the Editor of the 'Gardeners' Chronicle' by the Rev. H. H. Dombrain. It had more of the character of an *Irpex* than *Dædalea*, and was considered so interesting that it was desired that it should be photographed.

Specimens of a disease in shoots of Black Currant from the Rev. A. Fitch, received also from Dr. Masters, were then produced, Mr. Berkeley remarking that the outer bracts were hypertrophied, and, in consequence, the delicate divisions of the inner part of the bud were badly nourished, and death ultimately ensued. The Chairman pointed out its probable analogy with the galls in hazel produced by a *Cecidomyia*, which was confirmed by Professor Westwood, who stated that the disease in the Black-Currant shoots was produced by an extremely minute four-legged *Acarus*.

Two communications from Mr. Fish were then read, the specimens which were intended to illustrate them unfortunately not having been received.

Mr. Fish wished to ascertain the reason why the variety of Potato called the Lady's Kidney, which abounded in starch, did not produce secondary tubers during the wet weather of the late autumn, while other varieties produced them in abundance, or even a third growth of tubers. Kidney Potatoes are in general, it is believed, less subject to secondary sprouting than other races; and perhaps the abundance of starch may have some influence, as is the case with over-ripened potatoes, which, it is said, occasionally germinate with difficulty and produce the disease called "curl." It was, however, thought that it would be impossible to discover the exact rationale, while the Committee were desirous that Mr. Fish should lay before them any observations he might make in future with respect to this variety.

The other communication had reference to a crop of Beet on land which had received a strong dressing of guano. Scarcely any portion of the roots was above the surface.

It is well known that the aerial portion of the roots, which differs in structure from the lower portion, is comparatively much less rich in sugar, sometimes containing as little as 3 per cent. It was therefore hoped that Mr. Fish would still send specimens, especially of the Silesian Beet.

Dr. Gilbert stated that possibly an excess of nitrogenous manure would have the effect of swelling the root, so that the upper portion might be less developed.

The mode of cultivation abroad varies greatly, according to the manner in which the tax is collected, whether from the crop generally or from the actual amount of sugar produced. In the latter case it is obvious that it is of comparatively less importance to discourage as much as possible the growth of that part of the plant which contains but little sugar. The matter is therefore one of considerable interest, and it is desirable to have specimens especially of the Silesian Beet.

A curious fasciated rose-shoot was laid on the table by Dr. Masters, in the upper part of which a white mould was developed. Dr. Masters, however, had received no information respecting it.

A shoot of some Orchid was submitted to Professor Westwood which contained a living grub, the whole of the interior portion of the shoot being in a state of decomposition. The grub or pupa apparently belonged to some Chrysomelaceous genus, and might possibly account for the presence of the *Eurytoma* which came before the Meeting on a former occasion. There was, however, no information as to the source whence the Orchid came.

Mr. Horne laid on the table a valuable collection of photographs of insects which bore into sound or decayed wood in India, and of some which feed on leaves.

Major Trevor Clarke made a communication respecting the effect of drip in producing ulcer in plants, especially Aloes and Amaryllids. He found that Condry's fluid (permanganate of potash) was useful when applied in time. Dr. Voelker thought that carbolic acid would have the same effect. Mr. Wilson Saunders remarked that in such cases he found the component cells swollen and ruptured.

Dr. Masters read an interesting communication from Mr. Tillery on the acclimatization of Truffles in Australia, by the method proposed in the 'Gardeners' Chronicle,' 1869, p. 220. Mr. Andrew Murray doubted the possibility of cultivating Truffles there from the absence of calcareous matter, which must at any rate be imported to give any chance of success*.

GENERAL MEETING.

J. BATEMAN, Esq., F.R.S., in the Chair.

The several awards were announced by the Rev. Joshua Dix and Mr. Wilson, the latter of whom stated that reports as to the preservation of fruit had been received from all the Exhibitors at the previous Meeting to whom application had been made.

Mr. Berkeley stated that he had seen an authentic specimen of Le Jolis's *Phormium Cookianum*, which is identical with *P. Colensoi*. In this form or species the leaves very rarely split at the tip as in *P. tenax*, and the capsules are long, slender, and often spirally twisted; little regard, however, can be paid to the capsules, as they vary extremely in undoubted *P. tenax*. Messrs. Banks and Solander considered all the forms referrible to one species. Mr. Bull's plant is certainly a form of the plant of Le Jolis, and that of Mr. Veitch a form of *P. tenax*, distinct from *P. tenax variegatum*.

Attention was called to a group of *Primula*, consisting of *P. amœna*, *P. denticulata*, and *P. Fortunei*, from Mr. Ware, of Tottenham, and the true *Fuchsia macrantha*, from Mr. Wilson Saunders, which had already been noticed by Mr. Dix, as had also a shrubby *Lopezia*, which is believed to be quite distinct from *L. coronata*.

It was remarked that *Spiræa Thunbergii* which was exhibited at the last Meeting takes freely on different kinds of plum-stocks. Attention was then called to an *Anemone* which has been in flower all the winter at Chiswick, supposed to be of Greek origin, and received under the name of *A. blanda*. It is very closely allied to *A. apennina*, and is, perhaps, only an early-flowering variety.

* In the preceding page, Dr. Gilbert suggested that "tapping" should be substituted for swelling; and Professor Westwood stated that, on closer examination, the larvæ in an Orchid-shoot proved to be Curculionaceous. Mr. Tillery's paper is given at length in 'Gard. Chron.' 1869, p. 252.

Mr. Berkeley then stated the arrangements which were made for the more speedy publication of the Journal. During the Meetings of the Scientific Committee, a sheet or half-sheet would appear at each Meeting, the several parts being collected at the end of the year, so as to form a number of the Journal. Papers submitted to the Committee would thus obtain almost immediate publication. Arrangements were made that those persons who did not like to wait till the end of the year might have the separate sheets or half-sheets forwarded by post; but this would not prevent their having the perfect number when published.

The Chairman exhibited some curious knotted branches of Elm, which he obtained at Pau. Similar specimens had been exhibited on a former occasion from a tree in the garden of Mr. Burroughes, at Ketton, in Rutlandshire. The burrs were due to the formation of a number of adventitious buds. In the tree at Ketton one of the buds was developed in almost every burr, which was very rarely the case in the specimens from Pau. After some observations on the Orchids exhibited at the Meeting, and on some specimens of the *Citrus japonica*, Mr. Bateman adverted to the Packington plant-trainer, which seems rather complicated, but which he considered would be useful.

Floral Committee, March 16.—First-Class Certificates were awarded to *Spiræa* (or *Hoteia*) *japonica variegata*, a Japanese plant having the leaves beautifully reticulated with pale yellow, from Messrs. E. G. Henderson and Son; to *Azalea La Superbe*, an expanded smooth-flowered Continental variety, of a fiery-red coloured with violet spot, from Mr. Turner; to *Hyacinth Hector*, a bold single pale lavender or greyish mauve, from Mr. W. Paul; to *Cineraria Royal Purple*, a very showy richly coloured variety, with the florets of a deep violet, having round the disk a narrow white zone, and exterior to this another of crimson; this came from Messrs. F. and A. Smith. A Second-Class Certificate was awarded to the same for *Cineraria Ino*, a large white with narrow rosy-crimson belting.

Fruit Committee.—Mr. Melville, of Dalmeny, sent a large basket of *Variegated Kale*, among the specimens of which were hybrids between the Ragged Jack, Red Dutch, and annual Variegated Kale, the cross between the Red Cabbage being considered worthy of further experiment.

Précis of communications received as to the method of preserving fruit, from the different persons who exhibited or competed for prizes February 16, 1869.

1. As the flavour of fruit is so easily affected by heterogeneous odours, it is highly desirable that the apple- and pear-rooms should, if possible, be distinct from each other.

2. That the walls and the floor should be annually washed with a solution of quicklime, to which common salt is sometimes added.

3. That the room should be perfectly dry, kept at as uniform a temperature as practicable, and well ventilated; but that there should not be a thorough draft, which would cause the fruit to shrivel.

4. That the utmost care should be taken in gathering the fruit, which should be handled as little as possible.

5. That for present use the fruit should be well ripened; but if for long keeping, it is better, especially with pears, that it should not have arrived at complete maturity. This point, however, requires considerable judgment.

6. That no imperfect fruit should be stored with that which is sound, and that every more or less decayed specimen should be immediately removed.

7. That, if placed on shelves, the fruit should not lie more than two deep, and that no straw should be used.

8. That where especially clear and beautiful specimens are wanted, they may be packed carefully in *dry* bran, or in layers of *perfectly dry* cotton-wool, either in closed boxes or in large garden pots. Scentless saw-dust will answer the same purpose; but pine saw-dust is apt to communicate an unpleasant taste.

9. With care early apples may be kept till Christmas, while many kinds may be preserved in perfection to a second year.

SCIENTIFIC COMMITTEE.

MARCH 16, 1869.

A. MURRAY, Esq., in the Chair.

The Secretary laid on the table the 6th Number of the new series of the Society's Journal, and a separate sheet containing the proceedings of the last three Meetings.

Professor Westwood stated that the larva in the shoot of an

Orchid produced at the last Meeting proved, on close examination, to be Curculionaceous.

Mr. Berkeley read a letter from Mr. Blanchard in which he stated that the top of the pot in which the Pelargonium with adventitious rootlets grew was free from moss, cocoa-fibre, or any other substance.

The Rev. Adam Fitch sent further specimens of diseased black-currant shoots containing myriads of *Acari*, which are remarkable for having the abdomen finely striate transversely, so that the borders appear serrated, as well as for other particulars.

Mr. Wilson Saunders sent a sketch of very similar galls on hazel, which are produced by the larva of a *Cecidomya*.

A letter from Mr. Feeney was read relative to the ravages of a small cockroach in hothouses, and the difficulty of getting rid of the pest. A species of cockroach is very destructive at Chiswick, where there has been the same difficulty. Mr. Wilson stated that if a bowl is wrapped round with a wet cloth, they will get into the bowl, from which they cannot escape. It appears, however, that they soon become accustomed to any kind of trap (and the same may be said of poisonous food), and are therefore on their guard. It is believed that the species in question was first imported with Orchids.

Mr. Berkeley exhibited a curious form of *Capsella Bursa-Pastoris* with fern-like leaves, which he had found in two situations at Sibbertoft. Some doubt was expressed as to its being really a form of that plant; but it is now in flower, so that the uncertainty is removed.

Mr. Horne exhibited specimens of an *Æcidium* which is injurious to a species of *Amaryllis* in India. It is apparently a form of *Æ. Allii ursini*.

A letter from the Hon. G. J. Goschen was read relative to a disease in Tobacco-plants in New Grenada, accompanied by notes as to locality and culture, which will appear in the Society's Journal. The specimens were examined, and were quite free from any parasitic fungus, and it was the opinion of the Committee that the sudden death of the plants was attributable to great heat subsequent to an accidental deficiency of water.

Mr. Horne exhibited a curious excrescence on a shoot of *Acacia Lebbek* cut from a hedge-row in Manipura, North-west Province of India.

Mr. Berkeley produced sections of Plum, Peach, and Nectarine

wood which were affected by heat, in the first of which there was an abnormal deposit of cells in the cuticular layer.

Dr. Voelker read the Minutes of the Meeting of the Subcommittee March 1, on the comparative influence of manure on different plants.

Mr. Moore exhibited specimens of *Cyclamen* from Mr. Atkins, confirming the observations of Mr. Wilson Saunders at a former Meeting. He called especial attention to the characters furnished by the form of the mouth of the corolla, and by the mode in which fibres are sent out by the tuber.

A beautiful drawing, by Mr. B. Mee, of *Ilex Aquifolium*, var. *Lawsoniana*, was laid on the table.

GENERAL MEETING.

J. BATEMAN, Esq., F.R.S., in the Chair.

The awards of the Floral Committee were announced by the Rev. J. Dix; and Mr. Wilson stated, with reference to some fine, firm, well-kept Spanish Onions of English growth submitted to the Fruit Committee, that they were the result of heavy manuring and deep trenching. The seed was sown in February and the bulbs kept perfectly dry after they were taken from the ground.

Mr. Fortune read a paper on the Kumquat, which will be published in this Journal.

Mr. Berkeley mentioned various instances of variegated *Abutilon Thompsoni* affecting the stock, as reported in 'Gardeners' Chronicle,' 1869, p. 276, and by Messrs. Henderson.

A variety of *Triteleia uniflora* with blue-tinted petals and sepals, more acuminate than usual, came from Mr. Atkins, of Painswick, under the name of *Leucocoryne alliacea*. In that genus, however, there are three abortive stamens, which project from the mouth of the corolla, whereas, in the plant exhibited, all the stamens were perfect.

Mr. Standish sent specimens of several Conifers in flower, some of which are rarely seen in that state. The last hot summer will probably induce many similar cases. A large bush, for instance, of *Rhamnus alpina* in the Earl of Westmoreland's garden, at Ape-thorpe, has never produced flowers till the present season.

A flower of *Narcissus Sibthorpii*, from the garden of Mr. Lloyd Wynne, at Coed Loch, was pointed out as a fine subject for spring

cultivation. Mrs. Lloyd Wynne offers a prize for the best collection of species of *Narcissus*, but not of mere garden varieties, for the first Tuesday Meeting in April 1870.

Specimens of wood from peach- and nectarine-trees injured by heat at Chiswick were exhibited, with a diagram of a section of a plum-tree which had suffered from the same cause. The bark seems always to be cracked transversely. A curious anomalous growth of the bark, in the case of the plum-tree, was pointed out, no less than three abnormal growths having taken place apparently from some hypertrophy of the cortical layer. Protection from heat was shown to be quite as necessary in summer as from frost in winter. Tiles at the base of the tree are not sufficient, as the branches are frequently affected.

The Chairman then called attention to the fine plant of *Rhododendron Falconeri* in full bloom in the Society's Garden, and trusted that the genus would receive especial attention at South Kensington, as it seemed likely to prove a subject of great interest to the Members.

The Meeting then adjourned.

REPORT ON BEDDING PLANTS GROWN AT CHISWICK IN 1868.

By THOMAS MOORE, F.L.S., Floral Director R.H.S.

The following are brief notes of the results of the Trials of new varieties of Bedding plants in 1868, and will be sufficient for the use of cultivators, as indicating the colours, habits, and general peculiarities of the several kinds. The season, it will be remembered, was peculiarly hot and dry, and this may have moderated the vigour of some sorts, which in ordinary and moister seasons might have a greater tendency to leaf development. The exhaustive character of the weather may, on the other hand, in some cases have interfered with the normal continuity of bloom. The notes here collected will therefore have to be taken in connexion with these considerations.

In order to render this Report the more complete, the varieties of Pelargoniums which received Certificates in 1865 and in subsequent years, and which were grown with the newer kinds for comparison, have been included.

BEDDING PELARGONIUMS.

§ I. Leaves Self-Coloured (*P. inquinans* type).

A. LEAVES GREEN.

(a.) *Flowers single.** *Flowers round-petaled.*1. *Flowers Scarlet.*

ELEANOR (*Bull**). Compact habit; flowers bold, scarlet. 1st class in 1865.

PUNCH (*Fraser*). Vigorous habit; flowers bold, bright scarlet, abundant. 1st class in 1865, confirmed in 1868.

RED DRAGON (*W. Paul*). Of moderately vigorous habit; flowers very deep crimson scarlet, in compact trusses, and remarkable for their rich velvety surface. 1st class in 1865.

TRENTHAM SCARLET (*Fraser*). Compact habit; flowers bright scarlet. 1st class in 1865.

ST. GEORGE (*W. Paul*). A vigorous-growing variety, of erect habit, with deep crimson-scarlet flowers, resembling those of Sambo in colour. 1st class in 1868.

WARRIOR (*G. Smith*). Vigorous habit; flowers large, bright scarlet; a fine showy variety, in the way of Punch. 1st class in 1867, confirmed in 1868.

GOVERNOR (*Bull*). Vigorous; flowers large, scarlet, effective; closely resembles Punch.

The following varieties were passed:—*Atrosanguineum*, *Brilliant*, *Cardinal*, *Commodore*, *Nutt*, *Diamond*, *Edith*, *Eunice*, *Gloire d'Ecully*, *L'Étandard*, *Little David*, *Little Major*, *Lord Lyons*, and *Egby's Queen*.

2. *Flowers Cerise or Rosy Scarlet.*

LADY MIDDLETON (*Taylor*). Of moderately vigorous habit; flowers of a bright cerise or rosy scarlet. 1st class in 1865.

ROBIN HOOD (*W. Paul*). Vigorous; leaves lobed; flowers rich magenta scarlet; promising.

Passed over:—*Prince Teck*, and *Poet Laureate*.

3. *Flowers Rose-pink.*

CHRISTINE (*Kinghorn*). Of moderate vigour; flowers clear rose-pink. 1st class in 1865, confirmed in 1868.

MADAME BARRE (*Salter*). Of compact habit; flowers dark rose with paler eye. 1st class in 1866.

IMPROVED PINK (*G. Smith*). Moderately vigorous; flowers on long-stalked trusses, soft rose-pink, self-coloured; promising.

MIDLE RENOULT (*Barillet*). Compact and moderately vigorous; flowers rather small, but of a showy deep rose-pink; colour bright and effective.

Passed over:—*Belle Rose*, *Madame Evrens*, *Pink Hermit*, *Pink Pet*, and *Rose Queen*.

** *Flowers narrower-petaled* (*Nosegays*).

ORANGE NOREGAY (*W. Paul*). Straggling habit; flowers orange-scarlet. 1st class in 1866.

VULCAN (*Chater*). Of straggling free habit; leaves lobed; flowers clear scarlet, seminosegay. 2nd class in 1867.

CHRISTINE SURPASSE (*Chater*). Moderately vigorous; flowers clear soft rose-pink, self-coloured, in bold trusses, but the pips somewhat confused; promising.

* The names in parentheses are those of the donors.

COUNTRESS OF ROSSLYN (*Downie*). Vigorous in habit, with clear pink flowers; promising.

DUCHESS OF SUTHERLAND (*Turner*). Of moderately vigorous growth, with flat leaves, and true nosegay trusses of bold character, the colour deep rose with a dash of crimson. A fine telling variety both for beds and pots.

GLORY OF WALTHAM (*W. Paul*). Moderately vigorous, with deep scarlet flowers; promising.

INTERNATIONAL (*Turner*). Of dwarf compact habit, leaves flat; flowers large crimson scarlet, of good quality.

LILACINUM (*W. Paul*). Spreading and vigorous; flowers deep rose, with a lilac or bluish tint; promising.

PURPLE QUEEN (*W. Paul*). Moderately vigorous; flowers bright purple rose; very promising.

Passed over:—Abd-el-Kadir, Christine Nosegay, Constellation, Countess of Breadalbane, Edwin, Fame, L'Africaine, Maid of Kent, Naiad, Peach Nosegay, Scarlet Christine, Surpass Orange Nosegay, Thor, and Waltham Lilac.

(b). *Flowers double.*

GLOIRE DE NANCY (*Veitch*). A fine variety of vigorous habit, having on the bold green leaves a very indistinctly marked zone; flowers full double, in close large trusses, rosy scarlet. 1st class in 1867, confirmed in 1868.

B. LEAVES GOLDEN.

CREED'S SEEDLING (*J. Creed*). Compact growing; leaves yellow-green; flowers deep opaque scarlet. 1st class in 1866.

INTERNATIONAL (*Turner*). Dwarf and moderately vigorous; leaves flat yellowish green; flowers bright deep rose, free and telling. 1st class in 1868.

GOLDEN SUPERB NOSEGAY (*Sampson*). Of dwarf vigorous habit, with large flat yellowish leaves marked with indistinct zones; flowers dark crimson-scarlet. 1st class in 1868.

HYBRID IVY-LEAF (*Sampson*). Of moderately vigorous spreading habit; leaves yellow, glossy, lobed; flowers orange-scarlet; promising.

JASON (*Tirebuck*). Vigorous spreading habit; leaves flat, bright yellow; flowers scarlet; very promising.

LITTLE GOLDEN CHRISTINE (*Wimsett*). Compact; leaves flat, golden; flowers rosy-pink; a promising dwarf variety.

OCHROLEUCA (*Chater*). Dwarf, spreading, and moderately vigorous; leaves yellow; flowers deep scarlet, free.

Passed over:—Andrew Murray, Florence, Golden Dwarf, Hendersoni, Little Golden, Spread Eagle, Majesty, Ossian, Pillar of Gold, Pink Beauty, and Robert Fish.

§ II. Leaves Marginately Variegated.

A. MARGINS PURE WHITE.

ALBION CLIFFS (*Chater*). Of free and very spreading habit of growth; leaves white-edged; flowers light scarlet. The foliage was much more effective than in 1867, when it received a 2nd class. 1st class in 1868.

CASTLEMILK (*Austin & M'Aslan*). Of vigorous spreading habit; leaves with broad white edge; flowers scarlet. 1st class in 1867, confirmed in 1868.

JUNE (*Turner*). Moderately vigorous; leaves with white edge; flowers scarlet. 1st class in 1865.

MRS. LENOX (*Taylor*). Moderately vigorous; leaves with broad white edge; flowers scarlet. 1st class in 1865.

MOUNTAIN OF SNOW (*Fraser*). Of moderately vigorous spreading habit; leaves with broad white edge, very effective; flowers light scarlet. 1st class in 1868.

PRINCESS ALEXANDRA (*G. Smith*). Starved; leaves with broad white edge; flowers light scarlet. 1st class in 1867.

Passed over:—Bridesmaid, Brilliantissima, Crown Princess, Favourite, Honeycomb, Mary Ellen, Miss Kingsbury, Oriana Improved, Silver Star, Snowstorm, and Virgin Queen.

B. MARGINS CREAMY WHITE.

ALMA (*Turner*). Of vigorous spreading habit; leaves rather cupped, with a creamy edge; flowers scarlet. 1st class in 1865.

BRILLIANT SUPERB (*Parsons*). Moderately vigorous; leaves with creamy edge; flowers scarlet. 1st class in 1866.

FLOWER OF SPRING (*Turner*). Of compact and moderate growth; leaves with a broad creamy edge; flowers scarlet, of fine quality. 1st class in 1865, confirmed in 1868.

QUEEN OF QUEENS (*Bull*). Of moderately vigorous growth; leaves with creamy white edge; flowers scarlet. 1st class in 1865.

SILVER CHAIN (*E. G. Henderson*). Of compact habit; leaves with creamy edge; flowers scarlet, in the way of Flower of Spring. 1st class in 1865.

SNOWDROP (*Carter*). Moderately vigorous; leaves with creamy edge; flowers scarlet. 1st class in 1868.

Passed over:—Annie, Bijou Improved, Cheerfulness, Daybreak, Ellen Smith, Flower of the Day, Hendersoni, Koh-i-noor, Minnie Warren, Mountain of Light, Silver Queen, and Snowflake.

C. MARGINS YELLOW-GREEN OR GOLDEN.

CLOTH OF GOLD (*Turner*). Moderately vigorous, leaves with yellow margin and green centre. 1st class in 1865.

CRYSTAL PALACE GEM (*F. & A. Smith*). Dwarfish, but free in growth; leaves yellow-green with dark green radiate centre; flowers rosy scarlet. 1st class in 1866, confirmed in 1868.

GOLDEN CHAIN (*Scott*). A well-known standard bedding variety; leaves with a green centre, more or less radiate, and a golden edge. 1st class in 1865.

GOLDEN FLEECIE (*Veitch*). Dwarf; leaves yellow-green, with small radiate green centre; flowers scarlet. 1st class in 1865.

UNIQUE (*Garaway*). This variety has the general character of Golden Chain, but appears to be of freer growth; leaves with a green radiating centre and golden edge; it did not flower. 1st class in 1868.

PRIMROSE (*Carter*). Leaves with green centre and yellow margin; promising.

§ III. Leaves Zonate (*P. zonale* type).

A. LEAVES WITH GREEN MARGIN AND DISK.

(a). Flowers round-petaled.

1. Flowers scarlet.

ATTRACTION (*Bull*). Compact and moderately vigorous; leaves indistinctly zoned; flowers bright scarlet. 1st class in 1865.

AURORA (*Salter*). A variety of dwarf and compact habit, growing about 6 inches high; leaves with dull zone; flowers large, clear light scarlet; good for edging. 1st class in 1868.

CHIEFTAIN (*G. Smith*). Vigorous habit; leaves marked with a dull zone; flowers large, light scarlet. 1st class in 1866.

CLIPPER (*Bull*). Compact habit; flowers of a light scarlet, and of very fine form. 1st class in 1865.

DR. LINDLEY (*Bull*). Compact habit; leaves with dull zone; flowers light scarlet of fine shape. 1st class in 1865.

ETNA (*F. & A. Smith*). Moderately vigorous in growth, with dull-zoned leaves, and large clear scarlet flowers. 1st class in 1868.

- FAUST** (*Bull*). Of moderately vigorous habit; leaves very indistinctly zonate, almost plain; flowers large, very bright scarlet, in bold trusses and of fine form. 1st class in 1865.
- GARIBALDI** (*North*). Of compact habit, the leaves flat, with dark zone; flowers small, bright scarlet. 1st class in 1865.
- GLORIOUS** (*Downie*). Dwarf and compact in habit; leaves small, zonate; flowers abundant, comparatively large, clear intense scarlet. 1st class in 1868.
- GLORY** (*Fraser*). Moderately vigorous, with indistinctly zoned leaves, and large light reddish-scarlet flowers. 1st class in 1866.
- GLOW** (*G. Smith*). Dwarf, compact, and neat in habit, with small leaves marked with a dull zone, and large clear orange-scarlet flowers. 1st class in 1868; also 1st class as a pot-plant.
- MONS. G. NATCHET** (*G. Smith*). Of moderately vigorous growth, with zonate leaves; flowers of moderate size produced in fine trusses, scarlet. 1st class in 1865, confirmed in 1868.
- SAMBO** (*Downie*). Of moderate vigour, and somewhat erect-growing; leaves lobed and wavy, with dull zone; flowers rather small, but produced in good trusses, of a rich dark crimson-scarlet, and very distinct and effective. 1st class in 1867, confirmed in 1868.
- COMMISSIONER** (*Bull*). Compact; leaves with dull zone; flowers light scarlet. 2nd class in 1865.
- EMILY MORLAND** (*Tirebuck*). Habit moderately vigorous; leaves with dark zone; flowers large, scarlet, with white eye. 2nd class in 1867.
- EMPEROR OF THE FRENCH** (*Turner*). Of spreading habit, the leaves marked with a narrow vandyked zone; flowers small, scarlet. 2nd class in 1865.
- GERMANIA** (*Salter*). Moderately vigorous; leaves with dull zone; flowers large, light reddish-scarlet. 2nd class in 1866.
- MONTROSE** (*Bull*). Moderately vigorous; leaves zoned; flowers scarlet. 2nd class in 1866.
- REV. JOSHUA DIX** (*R. H. S.*). Moderately vigorous; leaves marked with a dull zone; flowers small, bright scarlet. 2nd class in 1865.
- CHIEFTIAN** (*Mann*). Leaves with dark zone; flowers large, scarlet, with small white eye; promising.
- COMPACTUM MULTIFLORUM** (*Mann*). Leaves with dull zone; flowers bright scarlet, of good form.
- EUCIAR** (*Pearson*). Moderately vigorous; leaves dull-zoned; flowers large, light scarlet; good early in the season.
- FEARNOUGHT** (*Chater*). Compact and moderately vigorous; leaves with a very broad dark glossy zone; flowers very bright scarlet with white eye; better than *Adonis*.
- FIERY STAR** (*Chater*). Vigorous, with dull-zoned leaves, and vivid scarlet flowers, of good form.
- GLORIOUS** (*F. & A. Smith*). Of moderately vigorous habit; leaves faintly zoned; flowers large, light orange-scarlet; promising.
- HECTOR** (*Smith*). Vigorous, with indistinctly zoned leaves, and very large scarlet flowers; promising.
- LA FOUDRE** (*Barillet*). Moderately vigorous; leaves with a narrow vandyked zone; flowers large, bright scarlet; promising.
- LORD DERBY** (*Mann*). Leaves with dull zone; flowers scarlet, of fine shape, but few in the truss.
- MONS. GALLAND** (*E. G. Henderson*). Vigorous habit; leaves dark green, with dull dark zone; flowers in close trusses, large, bright scarlet; promising.
- MURILLO** (*W. Paul*). Of erect and moderately vigorous growth; leaves very indistinctly zonate; flowers deep crimson scarlet, of a distinct character; promising.
- NYANZA** (*Windebank & Kingsbury*). Moderately vigorous, of erect compact habit; leaves with dull zone; flowers light scarlet; promising.
- PROCONSUL** (*Chater*). Moderately vigorous; leaves with indistinct zone; flowers very large, of fine form, light soft scarlet; promising.
- REV. DR. CAREY** (*Windebank & Kingsbury*). Compact dwarf habit; leaves with dark zone; flowers light scarlet, free; promising.

- SATISFACTION** (*Chater*). Vigorous; leaves dark-zoned; flowers light scarlet, in good trusses; promising.
- SOLFERINO** (*Chater*). Moderately vigorous, and erect; leaves dull-zoned; flowers small, in dense heads, crimson scarlet; distinct and promising.
- SUNNYSIDE** (*F. & A. Smith*). Compact habit; leaves with dull zone; flowers large, free, light scarlet; promising.
- VERCINGÉTORIX** (*Barillet*). Moderately vigorous; leaves lobed, with dull dark zone; flowers large, in large trusses, clear orange-scarlet; a good bloomer and very promising.
- VICTOR EMMANUEL** (*Clarke*). Vigorous habit, with indistinctly zoned leaves, and large trusses of bold free bright scarlet flowers.
- W. UNDERWOOD** (*Davie*). Dwarf, with broadly zonate leaves, and fine soft scarlet flowers; promising.

Passed over:—Acme, Adonis, Alfred, Autocrat, Banner, Bonaventure, Charles Aubrey, Claude, Climax, Colonel, Comte Zamoiski, Crimson Perfection, Constance Hault, Countess, Edith, E. Milner, Emperor, Feu de Joie, Flambeau, Foxhunter, Fulgens, Grace Holmes, Great Eastern, Henri Lierval, Highland Chief, Huntsman, Imperial, Inquisitor, James Campbell, Kate Anderson, Le Zouave, Lord Chancellor, Loyalty, Magna Charta, Magnificent, Mimosa, Model, Mons. Aimé Dubos, Mons. Barthère aîné, Mrs. Anderson, Mrs. Brock, Napoléon, Omega, Persurium, Pöser, Prince Impérial, Prince of Orange, Prudent Gaudin, Really Good, Reliance, Rifleman, Royalty, Solfatara, Sunlight, Triomphe, Triomphe de Courcelles, Vanquisher, Venus, Vivandière, Vivid, Welcome, and William Ingram.

2. Flowers Cerise or Rosy Scarlet.

- EPHRAIM** (*Carter*). Vigorous; leaves with dark zone; flowers soft salmon-rose, fine form, of the same character as *Lucius*, but with a more decided pink tinge in the colour of the flowers. 1st class in 1868.
- ALFRED** (*Pearson*). A moderately vigorous erect-growing variety, having zoned leaves, and flowers of a soft rosy scarlet, the colour of *Lucius*; fine and very free. 1st class in 1868.
- CHRISTIAN DÉEGEN** (*G. Smith*). Of moderate growth; leaves wavy and lobed, with faint zone; flowers rosy scarlet. 1st class in 1866.
- CRYSTAL PALACE GEM** (*Carter*). Of moderate growth; leaves flat and dark-zoned; flowers large, rosy scarlet. 1st class in 1867.
- EXCELLENT** (*Carter*). Compact habit; leaves with dull zone; flowers light red or salmon scarlet, very free. 1st class in 1866; confirmed in 1868 as a pot-plant.
- FORESTER** (*Carter*). A compact grower, with dark-zoned leaves and rosy scarlet flowers. 1st class in 1865.
- HECTOR** (*Bull*). Of moderate growth; leaves with dark zone; flowers large, deep carmine rose. 1st class in 1865.
- HERALD OF SPRING** (*Turner*). Rather vigorous; leaves lobed and wavy, with a dark feathery zone; flowers abundant and of fine shape, rosy scarlet. 1st class in 1865.
- MADAME MADELEINE** (*Fraser*). Of moderate vigour; leaves with dark zone; flowers in fine trusses, beautiful rosy scarlet, with white eye. 1st class in 1866; confirmed in 1868 as a pot-plant.
- MONS. MARTIN** (*Rollisson*). Of moderately vigorous habit; leaves with dark vandyke zone; flowers cerise scarlet, in bold trusses. 1st class in 1865.
- PROVOST** (*Bull*). A variety of moderate growth; leaves with a dull zone; flowers of a soft rosy scarlet, large, well-formed, and freely produced. 1st class in 1865, confirmed in 1868.
- REGALIA** (*Turner*). Dwarf and good, of compact habit; leaves small, zonate; flowers large and of fine shape, rosy scarlet; in the way of *Roi d'Italie*. 1st class in 1868.
- ROI D'ITALIE** (*Low*). This variety made very little growth; leaves zonate; flowers large, showy, rosy scarlet, with pale eye. 1st class in 1865.
- BONNIE DUNDEE** (*Bull*). Compact habit; leaves dark-zoned; flowers rosy scarlet. 2nd class in 1865.
- FESTIVAL** (*Chater*). Moderately vigorous; leaves dark-zoned; flowers rosy scarlet, free.

- ALEXANDER MCKAY (*Chater*). Moderately vigorous; leaves faintly zoned; flowers free, rosy scarlet.
- DERBYSHIRE HERO (*Cunningham*). Moderately vigorous; leaves with dark zone; flowers large, rosy scarlet; in the way of *Roi d'Italie*; promising.
- EMPRESS (*Paul*). Vigorous; leaves with dull zone; flowers cerise, free, in large trusses.
- FIRST FAVOURITE (*G. Smith*). Moderate habit; leaves with dull zone, lobed; flowers rosy scarlet, very large; in the way of *Roi d'Italie*.
- LUCIUS (*Bull*). Compact, but vigorous; leaves faintly zoned; flowers very free, in large trusses, cerise.
- JULES CÉSAR (*Fraser*). Very closely resembling *Roi d'Italie*; leaves with dull zone; flowers rosy scarlet; a free-blooming pot-plant.
- MRS. LONGMAN (*F. & A. Smith*). Vigorous; leaves marked with a dark zone; flowers rosy carmine, scarcely rosy scarlet; promising.
- PERSIAN (*Bull*). Vigorous; leaves lobed, with dull zone; flowers large, free, cerise.
- PRESIDENT JOHNSON (*F. & A. Smith*). Vigorous, leaves with dark zone, and free rosy-scarlet flowers.
- SIR F. KELLY (*Veitch*). Vigorous; leaves with faint zone; flowers cerise, freely produced.
- SOUVENIR DE M. BASSEVILLE (*F. & A. Smith*). Compact and moderately vigorous, with dull-zoned leaves, and free rosy flowers.
- UMPIRE (*Bull*). Vigorous, with faint-zoned leaves, and abundant soft rosy-scarlet flowers.
- VIRGINIA (*Paul*). Moderately vigorous; leaves with dull zone; flowers clear rosy pink, of the *Amy Hogg* character; promising.

Passed over:—Amy Rubotin, Andromeda, Annie Findlay, Britannia, Candidate, Crimson Cushion, Endeavour, Etoile des Massifs, Eugénie Furst, Festival, Hero, Illustration, In memoriam, La Niagara, L'Immobile, Lord Chancellor, Magnet, Matilda, Nora, Olivia, Prime Minister, Prince of Wales, Profusion, Rifleman, Rosabel, Tintoret, Victoire de Puebla, and Woodwardianum.

3. Flowers Rose-pink.

- BEAUTÉ DE SURESNES (*Salter*). Moderately vigorous; leaves with dull zone; flowers rose-pink, with white on the upper petals. 1st class in 1865.
- BLUE BELL (*W. Paul*). Of moderately vigorous habit; the leaves marked with a dull but deep-tinted zone distant from the margin, and the flowers very striking, of large size and fine form, in bold trusses, and of a deep bluish-tinted rose-pink, with white eye. 1st class in 1868. It was decidedly the gem of the season, and was greatly admired.
- PINK BEAUTY (*G. Smith*). Vigorous in habit; leaves with dull zone; flowers large, rose-pink, with white blotch on upper petals. 1st class in 1866.
- ROSE RENDATLER (*Downie*). Of moderately vigorous growth; leaves with a dull zone; flowers rose-pink, the upper petals with white blotches, free. 1st class in 1865, confirmed in 1868.
- WILTSHIRE LASS (*Downie*). Moderately vigorous; leaves with dull zone; flowers rose-pink, white on the upper petals, very like those of *Beauté de Surenes*. 1st class in 1866.
- AMY (*Rollison*). Vigorous; leaves dull-zoned; flowers abundant, pale rose, with white base to upper petals. 2nd class in 1865.
- MALTHES DE MARCOL (*Fraser*). Of free-branching habit, and remarkable for its abundant blossoms; flowers small, deep pink, with white eye. 2nd class as a pot-plant.
- DELICATA (*Chater*). Dwarf but vigorous, with large dark-zoned leaves, and pale pink flowers; promising.
- LORD FITZHERBERT (*Tirebuck*). Vigorous and spreading; leaves dull-zoned; flowers large, of fine shape, in good trusses, pale rose-pink, with white eye; promising.
- PINK PERFECTION (*G. Smith*). Dwarf and moderately vigorous; leaves with dull zone; flowers light rose-pink, with white eye, of fine shape, but produced in small trusses; promising.

SERENO (Bull). Vigorous; leaves with dull zone; flowers in good trusses, pale rose-pink, with white on upper petals; promising.

ALEXANDRA (Williams). Compact, with faintly zonate leaves; flowers rose-pink, with white eye; very like *Madame Lefevre*.

Passed over:—*Forget-me-not*, *Gloire des Roses*, *Kostchen Soheurer*, *Les Gaules*, *Madame Anguste Laloy*, *Madame Lefevre*, *Mdlle. Emmanuel Gaay*, *Mary Eveline*, *May Queen*, *Mona Leyens*, *Peach-blossom*, *Pink Globe*, *Rosa Perfecta*, *St. Pierre*.

4. Flowers Salmon-coloured.

FANTY (Bull). Of moderately vigorous habit; leaves darkly zonate; flowers of a light salmon-colour, deeper at the eye, free. 1st class in 1865.

JEAN VALJEANS (E. G. Henderson). Of moderately vigorous growth; leaves dark zoned; flowers bright and clear salmon-colour, in good trusses. 1st class in 1868 as a pot-plant.

MONS. BAREE (Low). Moderately vigorous; leaves dark zoned; flowers salmon-colour, free. 1st class in 1865.

ST. FIACRE (Salter). Compact; leaves dark zoned; flowers rich salmon, free. 1st class in 1865.

SERAPH (Downie). Moderately vigorous; leaves with a deep broad almost marginal zone; flowers fine, freely produced, salmon-colour, with white eye. 1st class in 1868 as a pot-plant.

AURICULA (Bull). Moderately vigorous; leaves dark zoned; flowers bright salmon. 2nd class in 1865.

CECILIA (Bull). Compact habit; small dark zoned leaves; flowers large, soft salmony red. 2nd class in 1865.

CHARLES ROUILLARD (Fraser). Moderately vigorous; leaves dark zoned; flowers salmon-colour, paler at the edges. 2nd class in 1866.

SOUVENIR DU 8 JUIN (Van Houtte). Moderately vigorous; leaves lobed, wavy, zonate; flowers bright salmon. 2nd class in 1865.

BARONNE HAUSMANN (Barillet). Moderately vigorous; leaves dark zoned; flowers free, salmon-colour, with paler margins; promising.

ETIENNE HENRI (Barillet). Moderately vigorous, with small zonate leaves and bright salmon-coloured flowers, sometimes mottled; a very floriferous and promising variety.

EUGENIE (Mann). Leaves with dull dark zone; flowers very pale salmony blush; promising.

JOHN VEITCH (F. & A. Smith). Vigorous; leaves with dull zone; flowers large, salmon-coloured, showy; promising.

ROSY MOEN (Mann). Leaves with dull zone; flowers of fine form, light salmon-pink; promising.

THEODORE (Windebank and Kingsbury). Moderately vigorous; leaves with dull zone; flowers large, salmon-pink; promising.

THOMAS MOORE (Windebank and Kingsbury). Moderately vigorous; leaves dark zoned; flowers salmon-colour, of good shape; promising.

Passed over:—*Alphonse Karr*, *Archevêque de Paris*, *Aurantia striata*, *Bridesmaid*, *Carminata*, *Carmine Stella*, *Charles VI.*, *Charlotte Corday*, *Cherub*, *Comtesse de Pourtales*, *Emile Carre*, *Emile Lucas*, *Fascination*, *Favourite*, *Floribundum*, *Henry Wadsworth Longfellow*, *Jeanne de Rohan*, *L'Abbe Samson*, *Lady of the Lake*, *Lord Vernon*, *Madame Louise*, *Mdlle. Augustine*, *Ma Gloire*, *Marginatum*, *Melanie Duhet*, *Madame Rudolphe Abel*, *Montem Smith*, *Nonsuch*, *Northern Rival*, *Pioneer*, *Princess Mary*, *Princess of Hesse*, *Princess of Wales*, *Psyche*, *Rosabella*, *Salamander*, *Seraphine*, *Souvenir de l'Isire*, *Vectis*, and *Virgile*.

5. Flowers Oculate.

AMELINA GRISAU (Salter). Moderately vigorous; leaves dark zoned; flowers white, with deep salmon eye; in the way of *Vestal*. 1st class in 1865.

EUGENIE MEZARD (Salter). Moderately vigorous; leaves flat, with dark zone; flowers blush-white, with deep salmon eye. 1st class in 1865.

MADAME VERLÉ (Fraser). Moderately vigorous; leaves with dark zone; flowers white, with pale salmon eye; fine form. 1st class in 1867.

MADAME W. PFITZER (W. Paul). Of vigorous growth; leaves with very dark zone; flowers white, with salmon eye. The variety sent as *Rosebud* by

Messrs. Windebank and Kingsbury was not distinguishable from this. 1st class in 1865.

ALICE (*Bull*). Moderately vigorous; leaves with dark zone; flowers white, with large pink centre; promising.

DAME BLANCHE (*Barillet*). Compact but vigorous, with dark zoned leaves and white flowers, with a bluish eye; distinct.

FAIRY QUEEN (*Windebank and Kingsbury*). Moderately vigorous; leaves dark zoned; flowers white, with a radiate salmon eye; promising.

MADAME BRUANT (*F. & A. Smith*). Moderately vigorous; leaves with dark zone; flowers deep salmon, with pale edges; promising.

MATHILDE MORET (*F. & A. Smith*). Moderately vigorous; leaves with dark zone; flowers bluish-white, with salmon eye; promising.

MEDEA (*Windebank and Kingsbury*). Dwarf and compact; leaves small, zonate; flowers white, with small deep salmon-pink eye; promising.

MISS LOUISA PYNE (*Windebank and Kingsbury*). Vigorous; leaves with dark zone; flowers white, with salmon eye; promising.

The delicate blossoms of this group are more suited for indoor than for outdoor culture. Hence some of the following, which were considered inferior, or superseded as outdoor plants, might be desirable for culture under glass:—*Ary Zang*, *Beauty*, *Bright Eye*, *Christabel*, *Festoon*, *François Desbois*, *Grätana*, *Henri de Beaudot*, *Juliette*, *Lady Hamilton*, *Le Prophète*, *Loveliness*, *Madame Dufour*, *Madame Gauffier*, *Monseigneur Lavergne*, *Madame Rudersdorff*, *Madame Van Houtte*, *Mdlle. La Comtesse de Lircourt*, *Princesse Mathilde*, *Queen of Beauties*, *Vestal*, and *Victory*.

6. *Flowers White.*

LA VESTALE (*Turner*). Of moderately vigorous growth; leaves marked with dull zone; flowers pure white, free, pure under glass, but suffused with bluish outdoors. 1st class in 1868 as a pot-plant, being considered the best white for pot-culture.

MADAME MARTHA VINCENT (—). Of vigorous growth, with dull zoned leaves, and bluish-white flowers. 1st class in 1867.

MDLLE. MARIE MEZARD (*Low*). Moderately vigorous; leaves zonate; flowers white. 1st class in 1866.

MADAME VAUCHER (*Low*). Moderately vigorous; leaves with dark zone; flowers white. 1st class in 1865.

PURITY (*Bull*). Of moderately vigorous growth; leaves dull zoned; flowers bluish-white. 1st class in 1867.

WHITE PERFECTION (*J. F. Chater*). Moderately vigorous, with dull zoned leaves and bluish-white flowers. 1st class in 1864.

ALBUM COMPACTUM (*Barillet*). Moderately vigorous; leaves lobed, wavy, with dull vandyked zone; flowers white; promising.

KING OF THE WHITES (*E. G. Henderson*). Moderately vigorous, with dark dull zoned leaves and white flowers; promising.

MADAME BARILLET (*Low*). Moderately vigorous; leaves with a medium dark zone; flowers white; promising.

QUEEN OF THE WHITES (*E. G. Henderson*). Moderately vigorous; leaves with dark zone; flowers white; promising.

VIRGO MARIA (*Fraser*). Moderately vigorous; leaves with dark zone; flowers white. On the whole this was probably the best of the whites in the present season.

WILHELMINE WEICK (*W. Paul*). Vigorous; leaves dull zoned; flowers bluish-white; distinct.

Passed over:—*Candidissimum*, *Emilie Vaucher*, *Lara*, *Madame Nardy*, *Snowball*, *White Pearl*, *White Tom Thumb*.

(b). *Flowers narrower-petaled* (Nosegays).

* *True Nosegays.*

1. *Flowers Scarlet or Crimson.*

BAYARD (*Pearson*). Dwarfish and free growing; leaves lobate, dull-zoned; flowers crimson-scarlet in large trusses. 1st class in 1868 as a pot-plant.

CYRISTER (Carter). Moderately vigorous, with zoned leaves, and loose bright scarlet flowers. 1st class in 1865.

HON. GATHORNE HARDY (Downie). A striking variety of moderately vigorous growth, with dull zoned leaves, and ample trusses of bright crimson-scarlet flowers of large size. Brighter and larger-flowered than *Stella*. 1st class in 1868.

LADY CONSTANCE GROSVENOR (Turner). A bright-looking variety of moderate vigour, having flat, dark zoned leaves; flowers bright scarlet. 1st class in 1867.

MISS PARFITT (G. Smith). A variety of moderate vigour, with a straggling mode of growth; leaves with faint zone; flowers scarlet. 1st class in 1866.

STELLA (E. G. Henderson). Moderately vigorous, with dull zoned leaves, and crimson-scarlet flowers. 1st class in 1865.

THE SULTAN (Downie). A robust close-habited variety, with faintly zoned leaves and free showy flowers of a bright red dashed with orange. 1st class in 1868 as a pot-plant.

WALTHAM SEEDLING (W. Paul). Moderately vigorous; leaves with faint zone; flowers rich crimson-scarlet; a fine and free-growing variety for either pot-culture or bedding. 1st class in 1866; confirmed in 1868 as a pot-plant.

CRIMSON QUEEN (W. Paul). Moderately vigorous, with dull zoned leaves and broad long-petaled flowers of a rich glowing deep-tinted scarlet; very promising.

GLOWWORM (Wills). Vigorous, with indistinctly zoned leaves, and free magenta-scarlet flowers.

GODFREY (Bull). Moderately vigorous; leaves with dull zone; flowers brick-scarlet, with broad, long petals; promising.

MRS. SINCLAIR (Downie). Compact and moderately vigorous; leaves indistinctly zoned; flowers dull scarlet, free.

TRIOMPHE DE STELLA (Garaway). Of spreading habit, with dark zoned leaves; flowers orange-scarlet, of good form; bloomed well early, but was over by the middle of September.

VESTA (W. Paul). Moderately vigorous; leaves with dark zone; flowers scarlet, effective; promising.

Passed over:—Adolphe Poullain, Baron, Black Dwarf, Black Prince, Cerise, Constant Nivelet, Firebrand, Grand Duke, Harkaway, Harry Hieover, Loveliness, Napoleon, Orange Bouquet, Red Robin, The Dwarf, Waltham Nosegay.

2. Flowers Rosy Scarlet, Magenta, &c.

LE GRAND (G. Smith). Moderately vigorous; leaves with dull zone; flowers large, rosy scarlet, in bold trusses. 1st class in 1866; confirmed in 1868.

MAGENTA (E. G. Henderson). Moderately vigorous; leaves with dull zone; flowers bright magenta-crimson. 2nd class in 1865.

PINK PEARL (Salter). Of compact growth, with flat faintly zoned leaves and rosy crimson flowers in moderate-sized trusses; a rather effective variety, having the colour of Lord Palmerston. 2nd class in 1865.

MAGENTA QUEEN (Wills). Of vigorous growth; leaves large, flat, zonate; flowers large, in bold trusses, bright rosy scarlet; good.

MRS. LAING (Downie). Moderately vigorous; leaves dull zoned; flowers rosy scarlet, tolerably free; good early in the season.

Passed over:—Blanche Lefevre, Comet, Hermit, Lord Palmerston, Minnie Petch, Mons. Bouchard de Bussy, Mons. Massena, Omen.

3. Flowers Salmon-coloured.

VIOLET HILL NOSEGAY (E. G. Henderson). Of compact habit; leaves zoned; flowers deep salmon. This variety was good early in the season. 1st class in 1867.

BARON DE STAËL (Frascr). Dwarf and compact; leaves dark zoned; flowers rosy salmon; suitable for edgings; free-flowering. 1st class in 1868; also 1st class as a pot-plant.

BIRDIE (*Garaway*). Dwarf and compact, with dull zoned leaves and salmon-coloured flowers; suitable for edgings.

MADAME JANVIER DE LA MOTTE (*Low*). Vigorous; leaves small, rather dark zone; flowers pale salmon-colour.

4. *Flowers Rose-pink, &c.*

LILAC RIVAL (*W. Paul*). Of tall, vigorous growth, with dull zoned leaves, and bold trusses of deep lilac-rose flowers, having the top petals marked with white; promising.

ROSE STELLA (*Downie*). Of vigorous habit, the leaves lobed and frilled; flowers in bold trusses, pink, slightly white at the eye; good early in the season.

Passed over:—Annulus, Cliveden Rose, Emeline, Fothergillii, Nil Desperandum, Pink Rosette, Premier, Souvenir de Sir J. Paxton, Stella's Spouse.

**** Seminosegays.**

AMY HOGG (*W. Paul*). Moderate growth, with dull zoned leaves, and broad-petaled deep rosy flowers. 1st class in 1865.

CHILWELL BEAUTY (*Pearson*). Of vigorous habit; leaves faintly zoned; flowers of deep rosy tint. Too nearly resembling Dr. Hogg in the flowers, but slightly paler in the zone. 1st class in 1868 as a pot-plant.

COMET (*W. Paul*). Vigorous in habit, with lobed wavy dark zoned leaves, and large trusses, of a dense and opaque bright orange-scarlet, showy. 1st class in 1868.

COUNTRESS OF STRATHMORE (*Downie*). Of vigorous spreading habit, with faintly zoned lobed leaves, and fine trusses of scarlet flowers having a slight rosy tinge. 1st class in 1868.

DR. HOGG (*W. Paul*). Of moderately vigorous habit, with lobed leaves marked with a medium zone, and deep rosy flowers; a fine variety for pot-culture. 1st class in 1867.

DUCHESS (*W. Paul*). Compact in habit; leaves faintly zoned; flowers of a rosy lake or magenta, very free. 1st class in 1865.

ECLAT (*G. Smith*). A variety of vigorous spreading habit of growth, having the leaves marked with a dull zone, and very large trusses of fine large dark rosy-scarlet flowers. 1st class in 1868.

FAIRY QUEEN (*W. Paul*). Compact growing, with dull zoned lobed leaves, and broad-petaled flowers of a rosy-crimson colour; it was good early in the season. 1st class in 1867.

INDIAN YELLOW (*W. Paul*). Of spreading habit, the leaves dull zoned, and the flowers of a distinct shade of pale orange-red. 1st class in 1865.

KING OF NOSEGAYS (*Downie*). Of moderate growth, with dull zone; flowers large, freely produced, light scarlet. 1st class in 1868.

MRS. MENZIES (*Downie*). Of moderately vigorous habit; leaves with dull deep zone; flowers free, rosy pink, in fine trusses. 1st class in 1868 as a pot-plant.

REBECCA (*W. Paul*). Moderately vigorous, with dull zoned leaves, and rosy-scarlet flowers. 1st class in 1867.

OBERON (*Bull*). Moderately vigorous, with zoned leaves; flowers broad-petaled, scarlet. 2nd class in 1867.

RACHEL (*Wood and Ingram*). Dwarf-habited and moderately vigorous, with dull zoned leaves, and bright magenta-rose seminosegay flowers with a dash of crimson; promising.

Passed over:—Camera, Clio, Essex Rival, Evening Star, Fanny, Kingfisher, Leah, Lizzie, Nimrod, Orange Girl, Ornement des Massifs, Polly, R. Fish, Sue, Tilda Toota.

B. LEAVES WITH GREEN MARGIN AND MARBLED DISK.

(a). *Flowers round-petaled.*

SHEEN RIVAL (*Kinghorn*). Moderately vigorous in habit; leaves marbled with light green and darkly zoned; flowers in fine trusses, bright light scarlet. 1st class in 1865.

Dr. NEWHAM (*E. G. Henderson*). Vigorous habit; leaves marbled, with dark zone; flowers carmine-rose, freely produced. 2nd class in 1866.

FLOSSY FOWLE (*Scott*). Vigorous; leaves marbled and darkly zonate; flowers small, bright scarlet, free.

OPTIMA (*Chater*). Moderately vigorous; leaves marbled, with dull chocolate-coloured zone; flowers free, large bright scarlet with lightish eye.

PIGMY (*Hally*). Dwarf compact habit, with marbled leaves, variously zoned, and white-eyed scarlet flowers; promising.

Passed over:—Candidate, Criterion, Flambeau, Kingsburyana, Lucy, Magnificus, Rosette Undergraduate.

(b). *Flowers narrower-petaled* (Nosegays).

TALISMAN (*Chater*). Vigorous, with marbled dark zoned leaves, and crimson scarlet flowers in fine trusses; very promising.

Passed over:—American Flag, Chameleon.

C. LEAVES WITH YELLOW-GREEN OR GOLDEN MARGIN AND DISK.

BEAUTY (*Wills*). Close habit and moderate growth; leaves yellow-green, with a well-defined but not very dark red-brown zone; flowers soft deep rose, affording a good contrast to the foliage. 1st class in 1866; confirmed in 1868.

BEAUTY OF CALDERDALE (*Wimsett*). Fine vigorous habit; leaves large, yellowish-green, with a broad, dark, conspicuous zone; flowers scarlet. It is effective from its bold, well-marked zone, but not so yellow as some others. 1st class in 1868.

BEAUTY OF OULTON (*Wills*). Free and of moderate vigour; leaves with dark zone; flowers scarlet. 1st class in 1865.

KENTISH HERO (*Downie*). Free, bright, and of vigorous growth; leaves yellow, with well-defined chocolate-red feathered zone; flowers rosy scarlet. 1st class in 1868.

MRS. J. TODD (*Downie*). Of compact habit; leaves yellow, with broadish red-brown zone, not very evenly marked; flowers rose-colour. 1st class in 1868.

JAMES RICHARDS (*R. H. S.*). Of vigorous growth; leaves yellow with dark zone, effective, equal in appearance to Beauty of Calderdale; flowers bold scarlet, freely produced. 1st class in 1868.

MASTER LEONARD (*R. H. S.*). Of a neat and moderately vigorous habit, with painted leaves, which are of a yellow-green, flaked here and there with dark green, with a broad and well-defined zone of reddish brown, shaded with darker brown; flowers deep red. The leaves are of the marbled character. 1st class in 1868.

GAIETY (*Wills*). Of spreading and moderately vigorous habit; leaves yellow-green, with a narrow feathery zone and wide margin; flowers scarlet, freely produced, and good. 1st class in 1865; 2nd in 1868.

GLOWWORM (*Wills*). Moderate in growth; leaves yellow-green, with narrow, dark, vandyked zone; flowers scarlet. 2nd class in 1866.

BEAUTY OF RIBBLEDALE (*Wimsett*). Yellowish, with narrow, dark, red-brown, vandyked zone. The young leaves were pretty late in the season.

CIRCLET (*Wills*). Of moderate vigour; leaves yellow-green, with dark, well-defined, vandyked zone; flowers large, soft scarlet; promising.

COLUMBINE (*R. H. S.*). Of moderately vigorous habit; leaves frilled, with a yellowish marbled centre and painted zone; flowers scarlet; quite distinct.

CONSTANTINE (*Backhouse*). Leaves yellow, with dark and conspicuous vandyked zone; flowers scarlet, of the nosegay character; promising.

EBOR (*Backhouse*). Leaves yellowish-green, with dark zone; flowers light scarlet; promising.

EDWARD GEORGE HENDERSON (*E. G. Henderson*). Yellow, with broad zone of red-brown; promising.

MODEL (*Wimsett*). Of compact spreading habit; leaves yellow-green, with brown zone near the edge; flowers rosy carmine. Pretty when closely viewed, but not effective at a distance.

MRS. HUGESSEN (*Turner*). Compact; leaves yellow, with dark zone; flowers rose-pink; promising.

PRINCESS OF WALES (*E. G. Henderson*). Leaves with narrow zone; promising.

REV. W. F. RANDLYFFE (*Windebank and Kingsbury*). Leaves yellow and brown; promising.

Passed over:—Arab, Catherine, Compactum, Countess of Kellie, Crown Diamond, Distinction, Eclipse, Egyptian Queen, Electric, Flora McDonald, Her Majesty, Luna, Madeleine Schiller, Mary Lister, Minnie, Mrs. Maxwell Hutton, Mrs. Bass, Novelty, Oriole, Painted Lady, Prince Leopold, Princess Alice, Sensational, Venus, Viceroy, Zebra.

D. LEAVES WITH GOLDEN MARGIN AND GREEN CENTRE.

LADY CULLUM (*E. G. Henderson*). Free and moderately vigorous; leaves yellow-edged, with broad, deep-red zone. The finest of this series. 1st class in 1868.

MRS. E. S. CONSTABLE (*E. G. Henderson*). Free and moderately vigorous; leaves with yellow margin and dark-red zone. 1st class in 1868.

MRS. POLLOCK (*E. G. Henderson*). Of vigorous growth; leaves bold, flat, yellow-edged, with dark-red zone, rendering them very effective; flower scarlet. 1st class in 1865; confirmed in 1868.

MRS. TURNER (*Turner*). Vigorous; leaves large, with broad yellow edge and broad zone of bright dark red; a fine telling variety. 1st class in 1868.

QUEEN VICTORIA (*Perkins*). Moderately vigorous; leaves large, flat, yellow-edged, with distinct red zone; flowers scarlet. The foliage of this was very effective. 1st class in 1868.

SUNSET (*E. G. Henderson*). Of spreading, vigorous growth; leaves lobed, yellow-edged, with orange-red zone; flowers bright red. 1st class in 1865.

ALHAMBRA (*F. & A. Smith*). Moderately vigorous; leaves flat, with yellow margin and dark-red zone; promising.

FLORENCE (*Wills*). Of spreading and moderately vigorous growth; leaves with yellow margin and broad and well-marked red zone; flowers scarlet; very promising.

HUNTINGDONIAN (*Wood and Ingram*). Leaves well marked, yellow, with red zone, but not so free-growing as other sorts; promising.

MISS MAULE (*Maule*). Not very freely developed; leaves with yellow edge and decided narrowish zone of chestnut-red; promising.

MRS. BENYON (*W. Paul*). Moderately vigorous; leaves broad, flat, with yellow edge and red-brown zone; flowers scarlet; promising.

MRS. G. WILLIAMS (*Chater*). Moderately vigorous; leaves yellow-edged, with dull-red zone; promising.

RUBY KING (*Carter*). Moderately vigorous; leaves finely marked, with yellow margin and bright red vandyked zone; promising.

SOPHIE DUMARESCUE (*E. G. Henderson*). Moderately vigorous; leaves with bright yellow edge and medium red zone; promising.

Passed over:—Lizzie, Meteor, Oberon, Queen of Tricolors, Red Gauntlet, Titania.

E. LEAVES WITH SILVER MARGIN AND GREEN CENTRE.

ARGUS (*G. Smith*). Moderately vigorous; leaves with creamy-white edge and faint zone; flowers bright scarlet. 1st class in 1865.

COUNTRESS OF WARWICK (*Kinghorn*). Of vigorous habit; leaves with creamy-white edge and faint dull brownish zone; flowers scarlet. 1st class in 1865.

FONTAINEBLEAU (*E. G. Henderson*). Moderately vigorous; leaves with creamy edge and faint pink zone; flowers rose. 1st class in 1866.

GLEN EYRE BEAUTY (*E. G. Henderson*). Vigorous; with leaves creamy margin and broad showy red zone. In the early part of the season it was even superior to *Italia Unita*. 1st class in 1868.

ITALIA UNITA (*E. G. Henderson*). Of moderately vigorous spreading habit ; leaves creamy white, with distinct rosy-pink zone ; flowers scarlet. 1st class in 1868.

VELVET CUSHION (*E. G. Henderson*). Moderately vigorous ; leaves flat, with green centre, creamy margin, and well-marked deep rosy zone ; very pretty and effective. 1st class in 1868.

MRS. CHATER (*Chater*). Compact habit ; leaves with broad creamy-white edge and pink zone ; flowers scarlet ; promising.

PICTURATUM (*Turner*). Vigorous ; leaves with narrow creamy-white margin and dull deep-coloured zone ; flowers small, bright scarlet, of the nosegay character. 1st class in 1865.

PRINCE SILVERWINGS (*W. Paul*). Moderately vigorous ; leaves with a yellowish margin while young, becoming whitish in age, and marked with a rosy-red zone, which is brighter on the younger leaves ; flowers scarlet ; a free-growing, effective, and highly promising plant.

Passed over :—*Amelia Halphen*, *Attraction* (*Gaines*), *Burning Bush*, *Cambridge Gem*, *Elegans*, *Empress*, *International*, *Lady Elena Mary*, *Little Beauty*, *Mrs. R. Wynn*, *Pearl*, *Rose Queen*, *Rosette*, *The Countess*, *Wassand-Hall Beauty*, *White Lady*.

§ IV. Leaves Angulate (*P. peltatum*, *lateripes*, &c.).

L'ÉLÉGANTE (*Cunningham*). A variegated ivy-leaved variety, likely to form a pretty edging-plant. 1st class in 1868.

FUCHSIAS.

These were grown as moderate-sized pot-plants, such as would be suitable for decorative purposes. They succeeded tolerably well in the earlier part of the summer, when the following notes were made, but later in the season were, like most other plants, quite overpowered by the excessive heat :—

CONSTELLATION (*E. G. Henderson*). Of erect habit and vigorous growth, with convolvulus-like flowers, with red sepals, and pale violet very much expanded finely shaped corolla. 1st class in 1868.

ENOCH ARDEN (*E. G. Henderson*). Of free and elegant habit, with erect, refracted, red sepals, and very widely expanded deep blue corolla. 1st class in 1868.

L'ELISIR D'AMORE (*E. G. Henderson*). Of moderately free habit ; flowers large, with reflexed red sepals, and large, moderately expanded, purple corolla, marked with red stripes. 1st class in 1868.

LIGHT HEART (*E. G. Henderson*). Of elegant habit, with neatly shaped flowers ; the reflexed sepals and short tube bright coral red, and the slightly expanded corolla very dark purple. 1st class in 1868.

FATHER IGNATIUS (*E. G. Henderson*). Of dwarf compact habit, with broad, reflexed, red sepals, and a mottled blue somewhat spreading corolla. 2nd class in 1868.

RODERICK DHU (*Low*). Of dwarf branching habit, with short, broad, red, closely reflexed sepals, and a very much expanded violet corolla ; free. 2nd class in 1868.

VAINQUEUR DE PUEBLA (*A. Henderson*). Of fine habit, with rosy-scarlet reflexed sepals, and double-white corolla ; a remarkably beautiful variety for vases and decorative purposes. 2nd class in 1868.

BLAND'S FLORIBUNDA (*Cannell*). Of small neat habit, in the style of *White Lady*, with reflexed rosy-scarlet sepals, and moderately expanded white corolla ; a free bloomer, and well adapted for beds or edgings, for which purposes it was Commended.

COMET (*A. Henderson*). Red reflexed sepals and expanded purple corolla ; free.

FAIR ORIANA (*A. Henderson*). White, with carmine corolla ; free.

GENERAL LEE (*Low*). Rosy-red sepals and close double purple corolla ; free.

LADY HEYTESBURY (*A. Henderson*; *Low*). Large-flowered and free, with long white sepals and corolla.

LORD ELCHO (*E. G. Henderson*). A large bright red and violet, the corolla not expanded; free.

MRS. MARSHALL. A free bloomer; flowers with a lengthened tube, spreading bluish-white sepals, and small red corolla.

MONS. BRUANT. Red, with white corolla; free.

PERFECT CURE (*Cannell*). Of good habit; flowers double, with red sepals and purple petals, unequal in length, so as to form an irregular corolla.

REINE CLAUDE. White, with pink corolla; free.

Passed over:—Black Prince, Blue Beauty, Caledonian, Cloth of Gold, Count Cavour, Diadem, Julia, La Favorita, Lucy Mills, Majestic, Profusion, Rose of Denmark, Schiller, Sunshine, Universal, White Lady.

PETUNIAS.

The following were all more or less of a free-flowering and showy character, the certificated sorts especially so:—

ELISA FANTASIE (*Fraser*). Double-flowered, dwarf, and of compact branched habit; flowers bright rose, becoming mottled with white. 1st class in 1868.

FANTY (*Bull*). Single-flowered and of fine shape, rose-colour, deeper towards the centre, and beautifully veined with dark red. 1st class in 1868.

LA COQUETTE (*Bull*). Double-flowered and of excellent habit; flowers fine, rose-coloured, pencilled with violet and blotched with white. 1st class in 1868.

ALBERT VICTOR (*Fraser*; *Low*). Double-flowered and of good dwarf habit; flowers rather thin, but of a bright rose-purple.

BOULE DE NEIGE (*Fraser*). Double-flowered, white, loose.

FAVORITE (*Bull*). Single-flowered, rich rosy purple.

FRESCO (*Bull*). Single-flowered, with irregular rosy edge.

LE NÈGRE (*Fraser*). Single-flowered, deep rose-purple.

LOUISE ALEXANDRE (*Fraser*). Single-flowered, large pencilled lilac.

MADAME THIBAUT (*Fraser*). Double-flowered; bright rose, mottled with white.

MARIE WALDER (*Fraser*). Double-flowered, purple.

MARTE DE GOLBENTY (*Fraser*; *Low*). Double-flowered, white, with dark purple stripes.

STRIPED BEAUTY (*Bull*). Double-flowered, purple, blotched with white.

BEDDING LOBELIAS.

Of these useful little plants fourteen varieties were cultivated, and the following were awarded First-class Certificates:—

BEAUTY OF RAVENSBORNE (*Carter*). Free-flowering, of a rosy-lilac colour; useful for its distinctness.

LITTLE GEM (*Bowie*). Free-flowering and dwarf; blue, with white eye.

TRENTHAM BLUE (*Stevens*). Dwarf-habited; flower of a light blue; good.

VERBENAS.

From amongst the Verbenas grown, and which generally, owing to the extreme heat and drought, were very indifferently flowered, the following stood out so boldly, and with such attractive features, as to secure in each case a First-class Certificate. They were:—

JAMES BIRBECK (*Perry*). A crimson-flowered variety, remarkable for its freely developed blossoms, and especially for continuing in an effective condition throughout the season.

JOHN WILSON (*Turner*). A very free-flowering and good sort, the flowers of the colour of *St. Margaret's*, crimson, with a bluish tint in the centre.

MISS WIMSETT (*Wills*). A free bloomer; violet-blue with a white eye; stands both sun and rain better than most varieties of this colour.

ANNUALS.

ASTERS.—Of these beautiful autumnal flowers, which have been greatly improved of late years, the following strains were grown. Boltze's, Dwarf Chrysanthemum-flowered, New Dwarf French, and Newest Victoria were the most desirable; there were various colours of each:—

- Boltze's New Bouquet* (Benary). 4 in. to 6 in. high; beautiful dwarf, free-flowering varieties.
Double Quilled (Stuart & Mein). 12 in. to 15 in. high; roguey.
Dwarf Chrysanthemum-flowered (Benary). Dwarf and good. A similar strain came from Messrs. Stuart & Mein.
Dwarf Large Chrysanthemum-flowered (Mackintosh). Dwarf; very showy.
Globe-flowered (Mackintosh). A mixed series, containing both quilled and tasselled sorts; not very good.
New Dwarf French (Carter). Dwarf growth, with small flower-heads and much-recurved florets; a very pretty type of Aster.
New French Peony-flowered (Mackintosh). A very fine strain; flowers large and abundant.
New Globe (Haage & Schmidt). 8 in. high; very good miniature flowers.
New Peony-flowered Perfection (Mackintosh). A good ordinary strain, not peony-flowered.
New Tall Large Chrysanthemum-flowered (Mackintosh). Good; rather tall.
Newest Victoria (Mackintosh). Generally very perfect flowers. They were the best formed in the whole series, and some of them models of symmetry and beauty. Mr. Benary and Messrs. Haage & Schmidt sent under this name a strain very similar to the foregoing.
Pyramidal Perfection (Benary). A good strain of large showy flowers.
Quilled Globe (Stuart & Mein). Tall and straggling.
Reine Marguerite (Stuart & Mein). Tall and straggling, with inferior flowers.
Victoria (Benary). 12 in. to 18 in. high; very handsome flowers.

GILIA LACINIATA (*Carter*). A dwarf, close-habited, Mexican species, producing a profusion of dark-blue flowers in heads, in the way of those of *G. capitata*. 1st class in 1868.

SWEET PEA & BLACK INVINCIBLE (*Carter*). A decided improvement on the old Purple Sweet Pea, with large bold flowers, having a dark narrow standard and deep purple wings. 1st class in 1868.

SWEET PEA & SCARLET INVINCIBLE (*Carter*). A most attractive variety, with abundant large showy flowers of a bright carmine colour, much finer than in the common Scarlet Sweet Pea. 1st class in 1868.

TROPÆOLUM KING OF TOM THUMBS (*Carter*). A dark-foliaged variety, with very rich deep scarlet flowers. 1st class in 1868.

TROPÆOLUM TOM THUMB CÆRULEUM ROSEUM (*Carter*). A free-flowering, dwarf-tufted growing variety, with very distinct-looking flowers, of a pretty rose-colour. 1st class in 1868.

Floral Committee, April 6.—First-Class Certificates were awarded to *Lilium Thomsonianum*, a curious Anthericum-like plant, with long flaccid leaves, and narrow-petaled pinkish flowers, from G. Wilson, Esq., who had received the bulb from M. Leichtlin; to *Agave De Smetiana*, a dwarf-growing species remarkable for the pale brown border and coarse irregularly curved spines on the margin of its leaves, from Mr. Green, gardener to W. W. Saunders, Esq.; to a *Cœlogyne*, supposed to be *ocellata*, a pretty white-flowered epiphyte, with the large patch of yellow on its lip bordered by a thin red line, from Mr. Williams, of Holloway; to *Ficus eburnea*, a bold-looking plant, with large subcoriaceous shining green leaves, marked by white ribs; to *Cineraria Orb of Day*, a rich crimson,

with grey disk, and narrow white zone, from Messrs. F. and A. Smith, Dulwich; and to a yellow-flowered Eastern *Rhododendron*, a variety probably of *R. Brookeianum*, a fine plant, with elliptic acuminate glossy leaves, and flowers of a clear pale buff-yellow from Messrs. Veitch and Sons, Chelsea. Second-Class Certificates were given to *Oymbidium tigrinum*, a pretty small-growing epiphyte, the flowers of which have long olive-tinted sepals and petals, and a white lip marked with transverse purple bars, from Messrs. Veitch and Sons; and to a good variety of *Oncidium nubigenum*, with white transversely barred sepals, and a broad white lip. beautifully spotted at the base with purple, from Mr. Bull. A remarkably fine plant of *Odontoglossum luteo-purpureum*, from the collection of the Lord Bishop of Winchester, Farnham Castle, received a Special Certificate. Amongst other subjects of interest may be mentioned a splendid bush in full blossom of *Rhododendron Countess of Haddington*, with lovely rosy-tinted flower tubes, from the Messrs. Veitch; *Rose Prince Leopold*, a promising purplish-crimson perpetual climber, from Mr. W. Paul, Waltham; and cut blooms of the Bhotan *Rhododendron Batemani*, purple, with crimson flowers spotted with black, a species with something of the arboreum character, and consequently tender, from Mr. Bennett, gardener to W. J. Bateman, Esq.

Fruit Committee, April 6.—A seedling apple without name came from Mrs. Blackett Ord, of Whitfield Hall, Haydon Bridge. It is a large prominently-ribbed tall cylindrical-shaped apple, flat at the base and the crown, resembling the old Catshead or Costard. It is a noble apple, and though perhaps more adapted for the kitchen than the dessert, was nevertheless a good-flavoured apple and not to be despised in that respect for the table, apart from its large handsome appearance. This was much commended by the Committee, and a desire was expressed that Mrs. Blackett Ord would have the apple sent again next year.

Mr. T. Lockie, gardener to W. H. Berger, Esq., The Court, Great Marlow, sent a dish of Reinette de Canada apples which had been produced on a tree grown in a ten-inch pot and which exhibited the results of a careful and meritorious system of orchard-house culture. The fruit large, well coloured, and the texture of the flesh peculiarly tender. To these were awarded a Special Certificate.

Mr. Craddock, gardener to Lord Willoughby de Broke, at

Compton Verney, sent a large specimen of the Shaddock and some fruit of the Seville Orange, both of which had been grown against the back wall of a vinery, where Mr. Craddock finds they succeed remarkably well and are exceedingly ornamental.

A box of six handsome fruit of a new variety of Cucumber called Blue Gown, raised by crossing Turner's Favourite with Telegraph, was exhibited by Mr. Lockie, Court Gardens, Great Marlow. They all measured 22 inches in length and were considered, for this season of the year, remarkably well grown. They received a First Prize, while Mr. Godfrey, gardener to J. Anderson, Esq., Ankerwyke, Wraysbury, received a Second Prize for a variety called Anderson's Perfection, but far inferior to the former. For White-spined Cucumbers Mr. Lockie obtained a First Prize for Berkshire Challenge, and Mr. Godfrey for Anderson's Perfection a Second; and for Smooth Cucumbers Mr. Gilbert, of Burghley, took a First Prize for Telegraph Improved.

SCIENTIFIC COMMITTEE.

APRIL 6, 1869.

Dr. THOMPSON, F.R.S., in the Chair.

The Minutes of the last Meeting were read and confirmed.

A letter from Mr. Fish was read regretting that he could not now send specimens of Beet and Potatoes which were referred to on a former occasion.

In only one of nineteen fields the Beet was sunk in the ground up to the crown, and in that there was a dressing of 5 cwt. of guano to the acre. The produce was an average of $9\frac{1}{2}$ per cent. of sugar, the range being from 5 to 12.80 per cent. Dr. Gilbert stated that the attempt to get too heavy crops was injurious, and that a good deal of the Beet is employed in the manufacture of a spurious sherry.

Dr. Masters stated that the *Blatta* mentioned at the last Meeting proved to be *B. melanocephala*, a species which occurs in the Indian Archipelago. The species, however, appears in this case have been imported from Bahia.

A communication was read respecting the tripartite fruits, consisting in nearly equal proportions of Citron, Orange, and Lemon,

each preserving its distinctive character, which occur in the East, and the supposed, but probably fabulous, mode of producing them.

A letter from Mr. J. Anderson Henry was read respecting *Cupressus Lawsoniana* and *C. fragrans*, which Mr. A. Murray believes to be distinct species. Mr. Murray stated that the seeds were originally sent in separate packets; and it is probable that native seeds are now mixed indiscriminately, which has given rise to the supposition that they are mere forms of one species.

Dr. Welwitsch exhibited a slab of the wood of *Herminiera elaphroxylon*, with a specimen of the plant from Mossamedes (*Cabo Negro*). It is admirably adapted as a substitute for cork for entomological purposes.

A specimen of *Lilium Thomsonianum* was submitted to Dr. Thompson, who undertook to examine it before the next Meeting. It was originally published as a *Fritillaria* by Royle; but though drops of fluid appear at the base of the divisions of the corolla, there is no pit as in the *Fritillaria*.

A form of Spot in Pelargonium was sent by the Rev. I. Dix, which was believed to arise from the action of drops of water on the subjacent tissues.

Mr. Horne submitted specimens of a species of a sawfly, belonging to the genus *Selandria*, which is destructive to Watercresses in India. Indigenous Watercresses, however, are not uncommon in India; so that it is not probable that the insect was imported. The species does not appear at present to have been examined critically.

Major Clarke brought a plant of *Coleus* in which the axillary buds had been pinched out, and the leaves in consequence greatly enlarged. It is a system pursued in the production of specimen Chrysanthemums, and may be useful in other cases.

It was reported by Dr. Hogg that the trial agricultural seeds had been sown at Chiswick.

The Meeting then adjourned.

GENERAL MEETING.

Major TREVOR CLARKE in the Chair.

The awards were announced by the Rev. J. Dix and Mr. Wilson, the former of whom alluded especially to one of the Cinerarias which obtained a First-Class Certificate as likely to form quite a new strain.

Mr. Berkeley pointed out some Elm branches from the gardens

at Chiswick very similar to what were exhibited at a former meeting by Mr. Bateman.

He stated that in the competition for the best collection of the genus *Narcissus*, the word was to be taken in its widest acceptation, the object being to encourage the cultivation of a tribe on which the beauty of our gardens in spring so greatly depends.

After adverting to the fact that the genus *Cephalotaxus* is monœcious, he observed that *Cephalotaxus Fortunei* and the one known as *Taxus Harringtonia* (which is quite different from *C. pedunculata*) are at once distinguished by the very distinct male inflorescence. A third species with short leaves was pronounced by Mr. Fortune to be at present undescribed.

A beautiful variety of *Rhododendron Brookeianum*, with self-coloured yellow flowers, was then pointed out as a fine specimen of cultivation as well as a most beautiful object.

A plant of *Thrixospermum luniforme* was adverted to as having produced spikes of flowers without a single leaf for the last two years. This is not, however, without precedent amongst Orchideæ, the aërial roots always containing a greater or less quantity of chlorophyll. Mr. Bateman instanced *Phalænopsis Lowii*.

Specimens of *Pinsapo* with abundant male inflorescence came from Mr. Earley. This, however, is far from being the first similar instance, and female fruit has been produced on our southern coast.

The fact of a promise of a good apple-crop on trees which fruited abundantly last year was pointed out, as also a contradiction of a statement that the buds of pear-blossoms were injured by frost some weeks since.

Specimens of *Peziza lanuginosa*, var. *Sumneri*, recently figured in the 'Transactions of the Linnean Society' were exhibited.

The Chairman pointed out the fact that, to secure the blossoms of *Funkia subcordata*, it was necessary to pinch out all except the strongest buds of the crown; and Mr. Bateman made some observations on the Orchids exhibited at the Meeting, which was then adjourned.

Floral Committee, April 20.—First-class Certificates were given to *Primula cortusoides lilacina*, a fine variety of the large-flowered Japanese form of the species, with handsome pale-lilac fringed flowers, from Messrs. Veitch and Sons, Chelsea; to *Odontoglossum Alexandræ*, var. *Warneri*, a pretty variety with rosy sepals

marked with bronzy spots, white petals, and a lip marked with a bronzy bar, yellow at the base, from B. Warner, Esq., Chelmsford; and to *Amaryllis (Hippeastrum) Mdlle. Titjens, Olga, and Alexandra*, three finely-shaped light-coloured varieties with white centres or margin, from Mr. Baxter, gardener to C. Keiser, Esq., Broxbourne. Second-class Certificates were awarded to *Amaryllis Duke of Edinburgh*, a deep crimson, also from Mr. Baxter; and to the pretty green-edged maroon-ground *Auricula Mrs. Butcher*, from Mr. Butcher, Camberwell.

Fruit Committee.—Messrs. Ewing and Co., of Norwich, sent fruit of a *Seedling Apple* called Lord Stanley. It is a rather large, conical, and bluntly angular apple, yellow and much covered with patches of russet. The flesh is yellowish, firm, briskly acid, and with a good flavour. It keeps sound till May. It was thought well of by the Committee. Mr. Gilbert, gardener to the Marquis of Exeter, Burghley, sent fruit of a *Seedling Apple* of good size and fine colour. The skin is almost entirely covered with dark red and has somewhat the appearance of Norfolk Biffin, though quite different. He sent also a pie made of the fruit; but the variety was not thought equal to many others in cultivation. Mr. Gardiner, gardener to W. E. P. Shirley, Esq., Easington Park, Stratford-on-Avon, sent a bunch of *Lady Downe's* and *Kempsey Alicante Grapes*, both in excellent condition and rich in flavour. The Committee unanimously awarded a Certificate of commendation for the excellent way in which they had been kept.

SCIENTIFIC COMMITTEE.

APRIL 20, 1869.

W. W. SAUNDERS, Esq., F.R.S., in the Chair.

Dr. Masters read a communication from Mr. Berkeley, who was unfortunately unable to be present, containing a Report on some diseased Peach-shoots forwarded by Mr. Fish. The disease in this case is not the same as that which affects the Peach-trees at Eastwell Park and elsewhere. The diseased portions ultimately become bleached and infested with a minute fungus. The disease often appears near the base of the shoots, and the upper end continues healthy for some time. At present the malady is confined to young trees, and it has been observed on trees under glass as well as out of doors. Mr. Berkeley also stated that the swellings

observed on the shoots of the Apple forwarded by General Monro were of the same character as those described by M. Lacaze-Duthiers as 'Galles internes fausses,' and considered them to be the result of the irritation produced by the Apple *Aphis*. The swellings are not confined to the neighbourhood of the buds.

Professor Westwood also sent a communication relating to the same Apple-shoots, but stated that he had failed to detect any insect or trace of insect-agency in the swellings.

A communication from M. Decaisne relating to the origin of the cultivated Apple and to the nature of the Paradise Apple was then read, which will appear in this Journal.

Some observations on a disease affecting the Sugar-cane in the Malayan peninsula were then read.

"The first symptom is the sudden withering of the tips of the older leaves; this soon extends to the younger ones, and in the course of a few days the whole green top is as dead in appearance as if it had been scorched by fire. The cane does not follow immediately, but sprouts at the joints for a while. These shoots, however, soon wither away also, and then the cane decays rapidly. The disease generally commences when the canes are about four or five months old, and begin to show joint above ground; and it seems from that time to go on spreading more or less quickly till the canes reach maturity. On examination no trace of injury from insects is perceptible; the roots are, to all appearance, healthy, and, beyond the withering of the leaves, the only evidence of disease is a reddish discoloration internally, especially near the joints and top. At the early stage even this discoloration is scarcely perceptible, but at a more advanced one it becomes very marked. Microscopic examination of those parts reveals nothing that can throw light upon the cause of the disease. As a rule the disease spreads from a centre, but is occasionally capricious in its movements. It seems to attack by preference the strongest and healthiest canes; but the weaker ones are by no means exempt, and it does not appear to be propagated through the top, as tops taken from the surviving canes of a diseased field have produced canes that remained healthy to the last; and a top fairly diseased will not grow at all."

It was remarked that the sugar-plantations in the Mauritius had been nearly destroyed by the same or a very similar disease.

Mr. Horne stated that he had seen the canes similarly affected in India, where it was usually attributed to the effects of exces-

sive drought, deficient irrigation, and imperfect nutrition. Ultimately it was resolved that the specimens should be sent to Mr. Berkeley, to be more fully reported on at the next Meeting of the Committee.

The Chairman read a note detailing the appearances presented by a second flower-spike of the Hyacinth Robert Steiger, which had been already exhibited to the Committee. When first shown, all the flowers on the spike were erect, unduly lengthened, and green. The blooms produced on the second spike were singularly intermediate in form and colour between the green erect ones and those usually produced on this variety. The details of these curious changes will be given at length in the 'Proceedings.' The Chairman exhibited a singular burr in the Scotch Fir, similar to those found in the Birch and other trees. Dr. Masters stated that he had seen similar affections in the same tree, and also similar aggregations of small cones. In Germany the occurrence had been attributed to the presence of *Peridermium Pini*.

It was then arranged that a Meeting of the Committee should be held in May, at Chiswick, for the purpose of examining the growth of the seeds in the experimental plot.

The Meeting then adjourned.

GENERAL MEETING.

J. BATEMAN, Esq., F.R.S., in the Chair.

The awards were enumerated by the Rev. J. Dix and Mr. Wilson; and Major Trevor Clarke, in the absence of Mr. Berkeley, made some observations as to the principal points of interest. He called especial attention to the striking varieties of *Primula cortusoides*, as showing the great disposition of the genus to assume different forms. He then brought before the Meeting cut specimens from his garden of *Bellevalia romana* and a double *Oxalis*, usually considered a double form of *O. cernua*, but differing from it in being spotted at the base of each leaflet instead of the leaves being spotted with black in all directions. He also brought a plant of *Lilium Thomsonianum* with brighter flowers than those of the specimen exhibited at the Meeting. The diagnosis had been confirmed by Dr. Thomson.

Mr. Bateman presented Mr. Anderson, of Meadow Bank, with the Challenge Medal as the most successful exhibitor of Orchids during the past year.

A second flower-spike of Rob. Steiger Hyacinth from the bulb exhibited on a former occasion at the R.H.S. produced twenty-three flowers, which may be classed thus for colour:—

Twelve had more crimson than green in the flowers.

Five were entirely green.

Six mostly green, with red points to divisions of the corolla.

One flower only had the original crimson-purple colour, with scarcely a tinge of green.

The more pronounced crimson tint was accompanied with a stouter and more normal shape of flower, which had also a more horizontal tendency. One flower of the spike was of the same elongated upright form as in the first spike.

The greater amount of colour was developed in the lower flowers of the spike except in three instances. These three were the most abnormal of all, green and vertical, and were placed as nearly as possible on the same plane.

The most normal flower was, as regards position, very little above the three most abnormal ones just mentioned.

The greater part of the crimson colour was developed on the tubes of the corolla.

This second flower-stem was slightly flattened and abnormal in the upper part.

Pollen in good condition was produced on one of the party-coloured flowers.

FLORAL COMMITTEE.

MAY 4, 1869.

In addition to a very fine plant of *Dendrobium Falconeri*, and a charming tuft of *Masdevallia Veitchiana* from the garden of E. Salt, Esq., both of which received Special Certificates, the following awards were made to novelties:—First-class Certificates to *Vanda Dennisoniana*, a Moulmein plant, with acutely bilobed leaves, and short spikes of large waxy-looking cream-coloured flowers, from Messrs. Veitch and Sons; to *Brassia Laurenceana longissima* from Costa Rica, a showy species, remarkable for the very long sepals of its prettily spotted flowers, also from Messrs. Veitch; to *Dendrobium xanthophlebium*, and also to *D. transparens*, the former with curious whitish flowers having the lip veined with bright orange, the latter with charming white purple-eyed

flowers, both from Mr. Sherratt, gardener to J. Bateman, Esq.; to *Struthiopteris orientalis*, a fine Indian and Japanese species, remarkable for its ovate sterile fronds and for the entire not moniliform indusia of the fertile ones, from Messrs. Standish and Co.; to *Dieffenbachia nebulosa*, a pretty hybrid form of dwarf habit, having the leaves clouded with yellow-green in the centre, darker green at the edge, and marked with white spots, from the Society's collection; to *Geonoma zamorensis*, a fine pinnated Palm from Mr. Bull; to *Azalea (indica) Madame Van der Cruyssen*, a beautiful bright rose-coloured sort, of good properties, from Mr. Turner; to *Olematis Albert Victor* and *Olematis Miss Bateman*, two varieties bred from *C. Standishii*, the former a shaded lavender-purple, the latter a pure white, both from Mr. Noble; and to *Pink alba multiflora*, a remarkably pure white early forcing variety, from Mr. Watson, florist, Hammersmith. A Second-class Certificate was given to *Podocarpus Maki variegata*, a shrubby Japanese plant with linear white-margined leaves, from Mr. Bull.

SCIENTIFIC COMMITTEE.

MAY 4, 1869.

T. THOMSON, Esq., F.R.S., in the Chair.

The Minutes of the last Meeting were read and approved. The Secretary suggested that the plant known under the name of *Pinus Clanbrasiliana* was probably raised from a cutting taken from a Burr. The Douglas Pine forms similar Burrs.

Mr. Berkeley reported on the diseased Sugar-canes from the Malay archipelago sent to the last Meeting. He found the ducts from the base upwards gorged with red matter, which was quite sufficient to prevent healthy development. The heart of all the young shoots was more or less decayed. The colour was so like that of nitrogenous matter when tested with sugar and sulphuric acid that he thought it might be worth enquiring whether an unusual amount of sulphur existed in the soil. The upper leaves were infested with a fungus; but it is very doubtful whether this has anything to do with the disease, though plants of *Achillea Ptarmica* attacked by a very similar fungus produce a fresh crop every year from the mycelium which seems to pervade every part of the plant.

Some Peach and Nectarine shoots were sent by Dr. Masters,

which were precisely in the same condition as those which were commented on at the last Meeting.

Diseased Vine and Peach roots were sent from Elvaston Castle. The former were in a dreadful state from the attacks of the root Aphid. The Peach roots are said to be attacked by the same insect, but there has at present been no opportunity of identifying the parasite. Mr. Berkeley has written to Mr. Brown to request him to send specimens for comparison.

A Vine root was placed before the Committee by Dr. Masters, the plant itself, and others in the same house, having been destroyed by the spawn of the common Mushroom, with which the soil had been accidentally impregnated.

A letter from Mr. Cunningham, gardener to Lord Ebury, was read, accompanied by twigs of Lime which had been decorticated. Some of the twigs were undoubtedly attacked by a *Sphaeria*, but the Committee believed, from the indubitable trace of teeth, that the others had been stripped by squirrels, which often injure Scotch Fir in the same way. Their condition was certainly not attributable to any insect.

A very interesting letter was read from Mr. J. Anderson Henry, detailing some of the results of his experiments on hybridizing, and accompanied by illustrative specimens. The letter will be published at length in the Society's Journal.

Dr. Masters then gave an account of the condition of the boxes of seeds under experiment at Chiswick. It appeared that there was no difference, whatever manure was used, in any of the boxes of the same seed as to the time of germination, though there are even now evident differences in the condition of the young plants.

Dr. Voelcker expressed his surprise at this, as he had found sulphate of ammonia retard germination.

Dr. Masters showed some excellent drawings of a pale yellow *Ophrys* found in Kent by Mr. Oxenden, who supposed it to be *Ophrys lutea*. It was, however, considered merely a pale variety of the *Bee Orchis*.

It was resolved that the Sub-Committee on Spots in Orchids should meet on the 20th May at Mr. Lowe's, Clapton, and that the experiments at Chiswick on the effect of different manures should be inspected on the 21st May.

Roots of a Pine were exhibited infested with mycelium, which was developed at the base of the trunk into the column of *Polyporus versicolor*. Several trees had died from a similar attack.

A letter was read from Mr. Hanbury, stating that the leaves of the Papaw are horizontal in the daytime, and become vertical in the evening.

The Meeting then adjourned.

Erratum in Report of the General Meeting, April 7, p. cxxix. "*Thrizospermum*" should be "*Thrixspermum*, Reichb."

GENERAL MEETING.

J. BATEMAN, Esq., F.R.S., in the Chair.

The Rev. J. Dix announced the awards of the Floral Committee, and called especial attention to a fine hybrid named *Dieffenbachia nebulosa*, Hyb., raised by Mr. Bause at the Society's Gardens at Chiswick.

Mr. Berkeley stated that it was thought expedient that the Prize for *Narcissus* should be postponed to a later period in the year than had at first been announced, and begged that specimens might be brought as they flowered to the Meetings, of which record would be kept, and that marked varieties should not be excluded.

He then produced plants of *Narcissus biflorus*, with one, three, or four flowers on the same stalk. This circumstance, in addition to the fact that it never, as far as has been observed, produces ovules, seems to indicate that it is a mere sport of some species, though considered indigenous. It has been long cultivated, and plants were still growing a few years since, and perhaps are to be found still, on the site of the old gardens, near the river Nene, of Fotheringhay Castle.

Attention was drawn to the curious fact that out of 6000 plants raised by Mr. Standish from a cross between *R. cinnamomeum Cunninghamii*, with a pure white ground, and early bloomer, and Minnie, of a pinkish white, the female parent a late-flowering variety, not a dozen resembled the latter.

Toxicophlœa spectabilis, a species from Natal, was then pointed out as belonging to *Apocynæ*, though at first sight so strongly resembling *Ixora*. The Dutch name the original species Gift-Boom (Poison-tree), the natives making a gelatinous decoction of the bark for poisoning their arrows.

Mr. Berkeley produced specimens of the pink variety of *Lychnis Dioica*, the anthers of which were infested with *Ustilago anther-*

arum. He took occasion to make some remarks on the mode in which, in certain cases, the spawn of parasitic fungi penetrates plants—and gave reasons why it was not probable that the notion is correct which has been prevalent, that Acorns from Truffle-grounds will produce, if planted in a proper soil, a crop of Truffles. The spores are very large; and there is no evidence to show that their mycelium has any power to penetrate the tissues of *Phænogams*.

Mr. Bateman then commented on the Orchids which had received certificates, and the Meeting adjourned.

Experiments on Primulaceæ.

In accordance with the intention expressed in my letter to your Committee, communicated through Dr. Masters, and which I observe is given in substance at p. 75 of the Horticultural Society's 'Proceedings,' I now respectfully beg to report the results of some of my experiments among the *Primulaceæ*. I say *some*, and and these but a few of those I had in hand, which have already produced results. For these results, so far as attained, I have not had long to wait, seeing I began my experiments in the spring of last year (1868), and now, in little more than a twelvemonth, I am enabled to lay before you four of the plants so produced in bloom, though some of them I fear will be past their best ere your Committee meet.

These consist of crossed seedlings, of which the *male* parent was a form of the "hose in hose" variety I had in my garden at Woodend, Perthshire—still a true "hose in hose," though small portions of the lower part, which should have been the *calyx*, were slightly green, without the least approach to run into *leafage*, as in the progeny now submitted. It was a proper *Primula*, though sometimes throwing up a *Polyanthus*-spike.

The *female* parents were of the *Polyanthus* form, of which some of the seedlings now sent partake.

I offer no descriptions, as the plants will speak for themselves, and you are far better able than I am to direct attention to their distinctive peculiarities; for no two of them, you will please observe, are exactly alike.

I have still other forms of this brood with *Polyanthus*-spikes, having large leaves forming a whorl round the umbel from which the individual flowers radiate, each individual bloom having, as in these shown, a 5-foliate involucre instead of a *calyx*. Others too

I have, with more elegant individual flowers, which, however, as I am again experimenting, I cannot part with.

Of all these the "hose in hose" was the *male* parent; for it failed to *reciprocate* the crosses which I made with it, unlike its progeny of the same brood with those sent, which seem to take on crosses from other *Polyanthuses* freely.

In all my crossings among the *Primulaceæ* I paid rigid attention to the requirements of Darwin's *dimorphic* law.

Yet I have had cases where its application was not called for. I refer in especial to another *Primula*, peculiar too, I believe, to the district in Perthshire to which I have referred,—a *blue*-flowered species, which, though a proper primrose in its general character, yet occasionally throws up a spike in the *Polyanthus* form. But in either case, the stamens and style are of about equal lengths, with the anthers and stigma pressing against each other. As I note upon the tally "*stigma* superior" or "*stigma* inferior," I felt at a loss, on repeated observations, which character to assign to it. For while they sometimes were of the same elevation, they occasionally varied, and I have in some blooms found the stigma slightly overtopping the anthers, though in general the inverse holds. Hence self-fertilization takes place in this species.

The same remarks apply to any plants I have examined of the *P. denticulata*.

I have been unable to effect any change on the *Primula polyanthus* by fertilizing with *P. Sinensis*. I got, in several cases, seeds to ripen; but though I took every care I could to prevent foreign intervention or self-fertilization, the latter must have taken place; for of all I have yet flowered, the progeny are all after the mother, true *Polyanthuses*. Yet I do believe the blood of the *P. Sinensis* must be in them; and I am this year trying how far, according to the ideas I before expressed, this may not tend to bridge the difficulty, and so effect communion where affinity has *first* been communicated.

The *P. Sinensis* obstinately held out against all foreign alliances whatever. It affords in this one of many instances I have had, of one species resisting all kindred species. And yet I have found such kindred species often prevail in the *inverted* cross; but never the *P. Sinensis*, which, I humbly incline to the belief, should form a *tribe* by itself.

On all the forms I possessed or could obtain of the *Primulaceæ* I made experiments, the *P. cortusoides*, *P. mollis*, *P. involucrata*,

P. cortusoides amœna, *P. auricula*, the *Dodocatheon* or American Cowslip, and a few others. But I failed to effect a *fertile* cross among these *inter se*, or with the *Primula veris* or *P. elatior*.

I may only cite one instance of an *abnormal* form being produced by crossing a *Polyanthus* with *P. cortusoides amœna*; but the progeny are simply *monstrous P. polyanthi*. But if aught of the *P. amœna* be there, I may (seeing the *reproductive* organs, at least the *female*, are perfect) bring out something of the latter species by repeating the experiment; and this, in fact, I have done.

Though I have thus failed in intercrossing the above distinct species one with another, to the effect of producing hybrid progeny, yet I did not fail entirely in producing hybrid seeds. And I shall now, as it may be instructive, detail in a few instances how far I succeeded in obtaining these.

Again, permit me to observe that in all my crossings in this tribe I adhered to the Darwinian theory of taking high anthers for long stigmas, and *vice versa*.

Experiment 2. I crossed *Primula cortusoides*, stigma *supra*, with *P. Sinensis alba*, stigma *infra*. Product 8 seeds; no plants came. I doubted if the seeds were fully ripe.

Exp. 6. Maroon *P. polyanthus* crossed *P. cortusoides amœna*: 3 seeds, 2 of them good, 1 abortive, failed to germinate.

Exp. 9. *Primula involucrata* crossed *P. cortusoides amœna*: 20 seeds, failed to germinate.

Exp. 11. Dark-laced yellow *P. polyanthus* crossed semidouble *P. sinensis*: 5 seeds, failed to germinate.

Exp. 12. Same *P. polyanthus* crossed large purple-flowered *P. Sinensis*: 4 seeds, seemed ripe, failed to germinate.

Exp. 18. *P. cort. amœna* crossed *Dodocatheon Jeffreyi*: very few, doubtful if ripe, failed to germinate.

Exp. 19. *P. cort. amœna* crossed semidouble white *P. Sinensis*: failed to germinate.

Exp. 20. *P. polyanthus* crossed *Dodocatheon Jeffreyi*: 4 or 5, apparently ripe, failed to germinate.

Exp. 22. *P. polyanthus* crossed *Dodocatheon Jeffreyi*: only 2 good seeds. Both have come, but have not yet bloomed. The foliage is that of the *Polyanthus*, which I fear it only is.

Exp. 29. *P. Sinensis* crossed *P. cort. amœna alba*: 2 seeds, failed to germinate.

There is in all this just so much of result as to encourage a

hope that, by following some of them up, a partial success may be obtained. And, singular as it may seem, I entertain more hope in drafting the *Primula* into the *Dodecatheon* than I have of any of the other crosses just enumerated as failures. The reason of this hope arises mainly from the experiment I have yet to give.

On 13th May last I obtained from a neighbouring nursery a plant of *Dodecatheon Meadia* for experiment. It was taken up from the open border and potted. Observing it to flag, I put it, pot and all, into a basin of soapy water, which wonderfully restored it. I put it in a cool place under glass, and then opened and emasculated every bloom left on the plant, first divesting it of every open flower. On 23rd May the *stigmas* appearing in condition, I crossed them principally with *P. Polyanthi*.

Having shortly thereafter to go to Perthshire, I left the plant, still in the soapy water, under charge of my gardener. When I returned on 12th June, I found every crossed pod, at least most of them, swollen to the normal size of ripened seed-pods. But the plant, which was then sickly, went off soon after, and I found the seeds, though swollen, pulpy and immature, and nothing came of them.

I fear I have detained you too long with these, at best, but unsatisfactory results. I am again in the thick of further experiments on this tribe, but, being obliged to go abroad, I shall not have much time to pursue them. I have heard that your able co-adjutor, Major Clarke, was at work among this *genus*. I hope, if so, he will not withhold his experiments, which must be instructive at least, but lay them fairly before you, as I have endeavoured to do. In the belief that he has been more successful than I have been,

I am,

Rev. Dear Sir,

Yours very faithfully,

J. ANDERSON HENRY.

FLORAL COMMITTEE.

MAY 21, 1869.

A Second-class Certificate was awarded to Messrs. Standish and Co. for a seedling *Rhododendron (Beauty)*, with a delicate apple-blossom tint, but with indifferent foliage.

A Second-class Certificate was also awarded to Mr. Parnell of Plumstead, for *Saccolabium curvatum*.

G. F. Wilson, Esq., sent a very neat and pretty yellow Lilly, *Lilium Szowitsianum*, not unlike *L. colchicum*, but paler.

Some fine tricolor *Pelargonium* were exhibited, but were reserved for the 22nd.

A First-class Certificate was given to Mr. J. Noble for a pale lilac seedling *Clematis*, *Lady Londesborough*.

Miss Maling, Woolston, Southampton, sent several flowers of her very beautiful Pansies, which must take a high position among the French Pansies, and become great favourites.

FRUIT COMMITTEE.

MAY 18, 1869.

A First-class Certificate was awarded to Mr. Turner, Slough, for Cucumber (*Blue Gown*). This variety obtained the first prize at the recent Cucumber Exhibition.

A First-class Certificate to Messrs. Nutting and Sons, for Sugar-Loaf Brown Cos Lettuce, which was also sent from Chiswick.

A Special Certificate to Mr. Earley, gardener, Digswell, for Mushrooms of peculiar excellence.

A Special Certificate to Mr. Gardiner, gardener, Easington Park, Stratford-on-Avon, for a collection of fruit, consisting of Grapes, Nectarines, Apples, &c.

Mr. Miller, gardener to Lord Foley, Worksop Manor, sent Brown Turkey Figs and Violette Hâtive Nectarines.

SCIENTIFIC COMMITTEE.

MAY 18, 1869.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

The Minutes of the last Meeting were read and approved.

Mr. Woodford, of Eastwell Park, sent further specimens of Peach, Nectarine, and Apricot shoots, the leaves of which and the shoots themselves were spotted, in some cases so much so as to threaten immediate or future death. Mr. Berkeley had seen precisely the same effect produced by rain falling on a tree through the opening of the glass which was lowered for ventilation. The whole effect of chilling may not show itself till after the lapse of

one or more years. The Chairman noticed a little mycelium-like down in the centre of some of the spots, to which he thought attention should be directed.

A quantity of young Pears greatly altered in form were sent by Mr. Webb, of Redhill, the condition being produced by the larva of a Dipterous insect, information on which was promised by the Chairman at a future meeting.

Dr. Thomson confirmed to a certain extent the observations on the deflection of the leaves of the Papaw at night, sent by Mr. Hanbury to the last Meeting; but the change of direction was confined to the young leaves.

A diseased specimen of the common white Lily was sent by Mr. Earley, the stem being split at the bottom, probably from overgrowth, and all the lower leaves dead and marked with white desiccated patches which had preceded their decay.

Specimens of paper spotted with *Conferva dendritica*, Agardh, were submitted to Dr. Gilbert as probably arising from manganese used in the manufacture. Their similarity to the markings in moss-agates, and to some form of manganese, was remarked by Mr. Horne and Dr. Masters.

Dr. Masters read a communication from Mr. Van Houtte on the effect of variegated Abutilon on the self-coloured stock. When the graft was removed, the stock recovered its original condition. Further information, however, was promised on this point.

Dr. Masters handed in a tabular statement of the progress of the experiments on the effect of different manures now carried on at Chiswick.

The Chairman then made some observations on wild Pears and Apples, on which he promised a paper for the Journal after he had had an opportunity of making drawings of sections of the fruit.

He then exhibited a Cucumber in which the petiole of the leaf was confluent with the fruit for more than two-thirds of its length. Dr. Masters remarked that the petiole did not always form a ridge on the fruit, but the leaf proceeded from the apex. In cases like that produced there were frequently three cells below the leaf and two only above. In this case, however, the fruit was quite solid.

Mr. Saunders produced flowering specimens of Paulownia, remarking that he believed the reason why it did not flower depended in general more on the wood not being well ripened than on early

frost. It was remarked, however, that unusually warm summers are generally succeeded by a mild winter. It flowers constantly at Vienna and Paris, where the winters are severe, but where the weather is not in general so variable as in this country.

The Meeting then adjourned.

GENERAL MEETING.

W. WILSON SAUNDERS, F.R.S., in the Chair.

The Certificates granted by the Floral Committee were announced by the Rev. J. Dix, who commented on the beautiful Pelargonias exhibited, stating, however, that no awards would be made till the 22nd.

The Rev. M. J. Berkeley, in the absence of Mr. Wilson, read the awards of the Fruit Committee, calling especial attention to the dish of Mushrooms exhibited by Mr. Earley, which proved of superior excellence when cooked. A large specimen of *Agaricus arvensis*, in an advanced condition, was sent by Mr. J. Barnard from Clapton, and a branch loaded with Apricots by Mr. Gardiner from Easington Park, showing the utility of a permanent protection of Frigi Domo during the blooming and setting periods in unpropitious seasons. Specimens of Potatoes were sent from Chiswick, showing the propensity this season to form tubers without or with only imperfect haulm. Mr. Berkeley stated that it perhaps depended on the same condition as that which produced curl, which is attributed to overripening of the tubers. Specimens of the Wall-Blut-Lettuce were also sent, which is of excellent quality, but would perhaps be objected to on account of the reddish tint. This is, however, greatly appreciated in Germany, whence Mr. Berkeley had received it under the name of "ausserordentlicher Salat."

Mr. Berkeley stated that the variegated Maple exhibited by Mr. Standish at the previous Meeting under the name of *Acer Japonicum* was a form of *Acer rufinerve*, Sieb. & Zucc., the rufous clothing of nerves having almost entirely vanished. He called attention to the curious little membrane replacing the ordinary tuft of hairs at the angles of the nerves on the under side of the leaves.

A second Prize for the genus *Narcissus* was offered by Lady Dorothy Nevil. The Rhododendron called *Beauty*, which obtained

a Second-class Certificate, was raised between *Minnis* ♀ and *Gem* ♂, the latter predominating.

A collection of cut flowers of *Rhododendron* was sent by Mrs. Lloyd Wynne from Coed Coch, Denbighshire, amongst which was a magnificent tuft of *R. Falconeri*, which had blown in the open air.

Especial attention was called to the golden-leaved Oak exhibited by Messrs. Lee, which promises to be a great acquisition. Mr. Berkeley observed that he had seen a large tree in Flintshire closely resembling it.

The Chairman called for a vote of thanks to Mr. Bateman for his munificent present of Orchids, to which Mr. Bateman responded, who then made some remarks on the Orchids exhibited at the Meeting, calling especial attention to a magnificent self-coloured *Acineta* from New Granada, which Mr. Saunders afterwards stated might be a mere form of *A. Humboldtii*. Beautiful, however, as the species are, they soon lose their fine tint and become dingy, A beautiful specimen of *Epidendrum aromaticum* was pointed out, which, however, belied its specific name, as it was scentless. The Chairman then commented on one or two Orchids from his own garden, contrasting a pretty *Polystachya* (which had the most delightful fragrance) with a curious species of *Ania* (of which the scent was detestable). After some observations on the multitudinous forms of *Agave*, which are highly valued on the Continent and which command a great price, the Meeting was adjourned.

FLORAL COMMITTEE.

MAY 22, 1869.

This was the occasion of the Special Pelargonium and New-Plant Show, and many interesting objects were shown. In the class for six new plants sent out in 1867-68, Messrs. Veitch and Sons took the Silver Flora and the Bronze Medals for the collections,—the front consisting of *Dendrobium Bensoniæ*, *Alocasia Jenningsii*, *Retinospora filicoides*, *Sanchezia nobilis variegata*, *Vanda insignis* (true), and *Dracæna regina*; the second comprising *Abutilon Thompsoniæ*, *Begonia boliviensis*, *Nepenthes hybrida*, *Acalypha tricolor*, *Phormium Colensoi variegatum*, and *Davallia parvula*. For the best six new plants sent out this year, Messrs. Veitch and

Sons won the Silver Medal with *Maranta tubispatha*, *Dracæna Macleayi*, *Croton maximum*, *Croton Hillianum*, *Dracæna nigro-rubra*, and *Davallia hemiptera*; and the Bronze Medal was awarded to the same growers for *Dieffenbachia Wallisii*, *Maranta princeps*, *Maranta chimboracensis*, *Croton aucubæfolium*, *Darwinia* (*Hedera*) *fimbriata*, and *Tbdea* (*Leptopteris*) *Wilkesiana*, the latter also receiving a First-class Certificate. For the best new plant shown for the first time in flower Messrs. Veitch received a Silver Flora Medal and a First-class Certificate for *Dendrobium Jamesianum*, a new nigro-hirsute species in the way of *D. infundibulum*; while, in the class for the best new ornamental-foliage plant shown for the first time, Messrs. Veitch were again successful in winning the Silver Flora Medal for *Croton Hookerianum*, a richly coloured sort, with vandyked centre of bright yellow, and the Bronze Medal for *Dracæna magnifica*, a magnificent plant with broad reddish leaves, both these receiving in addition First-class Certificates. For the best garden seedling Messrs. Veitch took the first prize (Silver Flora Medal) for *Rhododendron Lady Rolle*, a loose-trussed white-spotted flower; and Mr. Wimsett, Chelsea, took the second prize (Bronze Medal) for *Pelargonium Willsii rosea*, a new hybrid ivy-leaved variety, with handsome rose-coloured flowers. First-class Certificates were awarded to the following new plants from Mr. Bull:—*Encephalartos grandis*, *Latania rubra*, *Acer polymorphum palmatifidum*, *Ptychosperma nobilis*, *Hyophorbe Verschaffeltii*, and *Nothochlæna candida*. A similar award was made to Mr. Mann, Brentwood, for *Pelargonium Duchess of Abercorn*, a large circular rosy salmon zonal, and to *Illuminator*, a rich bright orange scarlet; also to Messrs. Standish and Co., for *Pelargonium Wilhelm Pfitzer* and *Marie Lemoine*, two fine new double-flowered zonals; to Mr. Harman for *Pelargonium Mrs. Lambert*, a robust variegated ivy-leaved variety; to Mr. Turner for *Pelargonium Heroine*, and *Fancy Pelargoniums Excelsior* and *Agrippa*; to Mr. W. Paul, for *Pelargonium Waltham Bride*, a silver-edged variety with fine white flowers; to J. H. Arkwright, Esq., Leicester, for *Rose Duchesse de Mecklembourg*, with pale rosy-tinted salmony flowers; and to Mr. Turner for *H. P. Rose Mons. Woolfield*, a large full-flowering bright pink suffused with rose.

FLORAL COMMITTEE.

JUNE 1, 1869.

On this occasion First-class Certificates were awarded to the following subjects:—*Alocasia Sedeni*, a hybrid between *A. metallica* and *A. Lowii*, partaking much of the character and appearance of the latter, from Messrs. Veitch and Sons, Chelsea; *Gymnogramma chrysophylla gigantea*, and *G. calomelanos gigantea*, large-growing and noble varieties respectively of the golden and silver ferns of our hothouses, from Messrs. Carter and Co., Sydenham; *Pelargonium Victor Lemoine*, the best of the double-flowered varieties, having bright scarlet flowers; and *Coleus Sansoni*, a silver sport of one of the broad-leaved Coleuses, with a broad white edge, and greenish chocolate blotch surrounded by a belt of deep rose,—both from Messrs. Downie, Laird, and Laing, of the Stanstead Park Nursery. A Second-class Certificate was awarded to *Lissochilus speciosus*, a rather conspicuous terrestrial Natal orchid, with large yellow flowers, shown by Messrs. Carter and Co.

FRUIT COMMITTEE.

GEORGE F. WILSON, Esq., in the Chair.

Messrs. Barr and Sugden exhibited several specimens of *Lettuces* in very good condition—Victoria, Stanstead Park, Eclipse, Brown Dutch Cabbage, Paris Green Cos, Field's Winter White, and Prince of Wales Cos. The last two were very similar to Moorpark and the common hardy green Cos of the market gardens. These had been planted in the open ground in October, and withstood the winter very well. The Paris White Cos, on the contrary, succeeded badly. Mr. Fenn, the Rectory, Woodstock, exhibited some remarkably fine specimens of *Yorkshire Hero Potatoes*, some of which were cooked for the Committee to taste, and were found extremely fine in flavour and very floury. This variety received a First-class Certificate on a previous occasion, and is altogether first-class.

SCIENTIFIC COMMITTEE.

GEORGE F. WILSON, Esq., in the Chair.

The Minutes of the last Meeting were read and approved.

Dr. Gilbert stated that the specimens of *Conferva dendritica*, Agardh, submitted to him at the last Meeting had been examined, that a little iron had been found, but that the specimens were too small and insufficient to give any reliable result.

Specimens of *Vinca* were forwarded by Mr. Wilson Saunders, infested with *Puccinia vinca*, and unaffected shoots to show the effect of the parasite.

A branch of Hawthorn was also sent by him with pink flowers. It was a seedling from a White Hawthorn, which in the first year of flowering produced white flowers, in the second flowers tinged with pink; and in the third year they were of a decided pink. The only way in which he could account for the circumstance, was the existence of a pink-blossomed thorn about sixty yards off, by which it might have been impregnated.

Specimens of a *Curculio* which infests Vines were submitted to Mr. Stainton, who promised to report on them at the next Meeting.

Mr. Burr sent cuttings of a Douglas Pine injured by frost. Of three trees planted in a triangle, only one was affected. It seemed clear that the injury dated from a time anterior to the last winter, and was probably of at least two years' standing.

Leaves of an Almond tree blistered and infested with *Ascomyces deformans* were brought by Mr. Berkeley, also shoots of Apples dying from the attacks of an *Oidium*, and leaves of Pears covered with little warts, which he thought might arise from a minute *Acarus*. There was a little aperture at the top of many of the warts, but not of all. The true cause of the affection was considered doubtful.

The Report of the Meeting of the Committee at Chiswick, May 21, was read, and the Members were invited by Dr. Gilbert to Rothhampstead on the 8th to inspect the Grasses under experiment.

Green-centred Roses were submitted to the Meeting, the supposed cause of which was variously stated, without, however, producing conviction.

A specimen of Vine manure was submitted to the Meeting by Dr. Voelcker, offered at £2 a cwt. It was considered to be a good manure, consisting of ground boiled bones, the smaller proportion of nitrogenous matter being considered favourable to the health of the Vine. The intrinsic value of the manure was stated to be £6 a ton.

Specimens of *Myosotis dissitiflora* were sent by Mr. Fish, with a view to ascertain if possible why some plants bear for a time smaller flowers, and then occasionally recover their more normal condition. Dr. Masters confirmed the statement of Mr. Fish; but no one could suggest a cause.

Beautiful specimens of Variegated Elm were submitted to the Meeting. It was stated that it is very difficult to propagate.

Dr. Masters produced a sketch of a curious pelorioid form of *Calceolaria*.

The Meeting then adjourned.

SCIENTIFIC COMMITTEE, CHISWICK.

MAY 21, 1869.

J. R. REEVES, Esq., in the Chair.

After an inspection of the seed-boxes, the following resolutions were agreed to:—

1. Not to water the plants.
2. That the notes and observations taken by Mr. Barron and Dr. Masters be continued on the plan proposed by Dr. Gilbert, subject to such modifications and additions as may be found requisite.
3. That the plants be allowed to grow till their seed is fully ripened.
4. That the seedlings be not thinned, but that rogues and weeds be removed.
5. That Mr. Barron be requested to adopt such methods for the protection of the plants from vermin &c. as may seem to him in his discretion requisite.

GENERAL MEETING.

June 1, 1869.

JAMES BATEMAN, Esq., F.R.S., in the Chair.

G. F. Wilson, Esq., said that Mr. Fenn's experiments on Potatoes were of so much importance that he had requested him to place his remarks on paper.

Mr. Berkeley called attention to a fine collection of flowers of *Æsculus* from Chiswick. In consequence of the hot summer of 1868, seeds of *Æsculus californica* had ripened, and several plants had been raised from them.

Flowers of a pink-blossomed Hawthorn were sent by Mr. Wilson Saunders, from a tree which formerly bore white blossoms.

Specimens of *Pinus Douglasii* suffering from frost were exhibited. Mr. Berkeley remarked that seeds should be obtained from northern localities, those from more southern districts being tender and apt to lose their leaders.

The chairman, referring to the specimens of *Calochortus* exhibited at the Meeting, hoped that persons travelling through the districts lately visited by Sir C. W. Dilke would not forget that there was many a lovely gem which would be a great acquisition to our gardens.

The following is the substance of Mr. Fenn's remarks on clubbing:—

Clubbing is peculiarly prevalent this season, small tubers being produced without any, or only imperfect, foliage. The following method has been adopted for its prevention. The seed potatoes are placed in wooden trays, which are simply made of old doors with laths nailed round them. The potatoes are kept in a single layer in a subdued light from the moment that they are taken up till about three weeks before the time of planting, when the strongest eye in each is selected and every inferior one scooped out—the consequence of which is, that there is one young shoot to each tuber, as thick as one's little finger, firmly attached to the tuber as the limpet to the rock, and club is completely prevented. A good deal of the club in the present year has probably arisen from the seed potatoes consisting of those which were the second growth, at the end of the hot weather.

FLORAL COMMITTEE.

JUNE 15, 1869.

The most remarkable objects at this Meeting were:—*Calamus ciliaris* from Mr. Williams, with a slender stem and close pinnate feathery hairy leaves ; a double violet-purple *Clematis* with large guard sepals, of the Lanuginosa breed, named Excelsior, from Mr. Cripps ; a rosy-purple Pillar Rose, Prince Leopold, from Mr. Paul, a *Miltonia*, probably *M. festiva*, from Mr. Findlay ; and a very handsome ivy-leaved Pelargonium, Gem of the Season, with abundant salmon-pink flowers, to which a First-class Certificate was awarded, as also to a beautiful variety named "Admiration," from Mr. Foster, and a Second-class to one named "Polly."

FRUIT COMMITTEE.

The objects exhibited were few in number. The only novelty was a large Cabbage-lettuce from Messrs. Barr and Sugden, named Covent-Garden White Dutch, of good substance and excellent flavour.

SCIENTIFIC COMMITTEE.

W. W. SAUNDERS, Esq., F.R.S., in the Chair.

The Minutes of the last Meeting were read and approved.

A letter from Mr. Deavin was read, relative to some Peach-leaves which were perforated with small holes, after the appearance of which gumming took place, the leaves fell, and the shoots died ; but below the spot whence the gum had oozed, new shoots were given off and the fruit was perfected. It was believed that the holes and subsequent gumming were due to cold. Lime-shoots in a similar condition were sent from Eastwell Park. A communication from Dr. Mueller was read, respecting the effect of frost near Melbourne, which will be printed in this Journal.

Mr. Horne made some remarks on the fertility of Oats near Benares : one plant had thirty-five stalks, and bore 4180 grains. And similar instances were given with respect to other cereals.

Mr. Fenn sent a communication respecting the clubbing of Po-

tatos, in which also he remarked that when the Ribstone Pippin was grafted on the Blenheim Orange, the flavour was impaired, but the culinary qualities improved.

Dr. Thomson brought bladder-plums from Sibbertoft, in Northamptonshire, where they were extremely abundant. It appeared that the peculiar condition was due to a parasitic fungus (*Ascomyces deformans*, Berk.). A form of the Bird-cherry, called *Cerasus cornuta*, exhibits a similar phenomenon in India; and a species of *Rhus* was stated to be sometimes affected in the same way.

Dr. Masters brought a series of malformations, viz.:—fasciated stems of *Carduus palustris*; double flowers of Apples, with highly enlarged petals and the carpels superior; flowers of Epacris, in which the place of the pistil was supplied by a leafy shoot; and regular cup-shaped flowers of *Digitalis purpurea*, with the axis prolonged through the centre and bearing flower-buds.

Mr. Bennett brought fasciated stems of a Willow.

Major Trevor Clarke brought a Pelargonium, to show the effect of artificial manure in developing the leaves. A series of experiments has been undertaken at Chiswick to ascertain the effects of various manures on the colouring of the foliage.

Mr. Berkeley remarked that in most instances the colouring of the upper surface of the leaves depended on the subjacent cells containing different colouring-matter, but in the bronze zonals the contents of the distinctive-cells were really bronze-coloured.

The Chairman remarked that the pink Hawthorn-flowers before alluded to were taken from a seedling of a White Hawthorn, which at first bore white flowers. He also exhibited some Oat-plants which were much dwarfed, producing stolons from the gouty base, with unhealthy foliage and never producing ears. This peculiarity was said to be common in some years, but absent in others.

Some swollen stems also of *Crepis biennis* were shown, the effect of the larva of some Dipterous insect.

GENERAL MEETING.

Lord LONDESBOROUGH in the Chair.

A Silver Medal was awarded by the Council to a wonderful collection of artificial flowers, from M. Baulant, Rue Marsolier,

Paris. The imitation was, in some cases, so perfect as to create at first sight a doubt whether they were really artificial. Mr. Berkeley drew attention to a group of *Rhododendrons* from Mr. Noble, containing a semidouble variety with flowers exactly those of the male parent, showing how a monstrosity may be handed down from one generation to another. A *Pelargonium* was sent by Mr. Wilson Saunders, attacked by *Orobanche minor*. Mr. Berkeley stated that a species of *Oidium* was doing great injury to the young shoots of Apple-trees. Major Trevor Clarke showed specimens of *Ornithogalum ciliatum* which would prove an ornament to our shrubberies, and the rarely seen *Mantisia saltatoria*.

Mr. Bateman commented upon the Orchids exhibited at the Meeting, and read a short paper from Mr. Fortune on *Spiræa palmata*.

SCIENTIFIC COMMITTEE.

June 25, 1869.

ANDREW MURRAY in the Chair.

On inspecting the seed-boxes at Chiswick it was found that the plants had, for the most part, grown too thick and close to allow a fair comparison to be instituted: and in some instances they had even begun to decay; this was ascribed to their having been too thickly sown, and the soil having been too rich.

It was therefore resolved:—

1. That they should be cut off and allowed to start afresh.
2. That, after being cut, the produce should be intrusted to Dr. Gilbert for examination, viz. such (as weighing, drying, analyzing, &c.) as he might think necessary, who undertook to send his assistant to take notes previously, and to assist in the work of cutting, sorting, packing, &c.
3. That the plants be not thinned this season, but allowed to take their chance, and that they should again be inspected later in the season, when the course of experiment for next year could be discussed.

It was ordered that these resolutions should be communicated to Dr. Masters, who had already taken full notes of the progress of the experiment, in order that he might complete any observations he wished to make before the plants were cut.

FLORAL COMMITTEE.

JULY 8, 1869.

Messrs. Veitch and Sons showed their beautiful hybrid *Begonia Sedeni*, a crimson-flowered sort obtained from a cross with *Boliviensis*. First-class Certificates were now awarded to the Messrs. Veitch for the handsome green- and purple-flowered *Cypripedium Parishii* and for *Miltonia Regnelliana purpurea*, a fine variety with a deep purple lip; to Mr. Edwards, Nuthall, near Nottingham, for *Pteris serrulata cristata magnifica*, a splendidly tasselled free-growing form; and to Mr. Williams, Holloway, for *Adiantum Capillus-veneris undulatum*, a dwarfish variety with crisp fronds.

JULY 19. MANCHESTER.

The novelties in the floral department were few, if we except a numerous batch of new seedling British Ferns from E. J. Lowe, Esq., J. Mapplebeck, Esq., and Messrs. Stansfield, some of which were very curious and interesting. Mr. Williams had *Cordyline indivisa latifolia*, remarkable for the great breadth of its leaves; *Todea intermedia*, a New-Zealand Fern, intermediate in character between *T. superba* and *T. hymenophylloides*; and a forked form of *Cibotium Schiedeii*, called *furcans*. Mr. Barron, of Elvaston, showed *Abies Douglasii acutifolia*, a variety of distinct character. These all obtained First-class Certificates, as did about forty of the new ferns above referred to. Noble examples of *Izora Colei* from Messrs. E. Cole and Sons, of *Anæctochilus Loweii* from Mr. W. E. Dixon, and of *Alocasia Jenningsii* from Mr. Stevenson, were, on the recommendation of the Floral Committee, awarded Silver Medals.

AUGUST 3.

First-class Certificates were given to *Athyrium Filix-fœmina Kallothrix*, a charming fringe-toothed variety of Lady Fern, from Mr. Howlett; to *Trichotosia ferox*, a singular drooping-spiked Orchid, everywhere clothed with reddish hairs; and to a species of *Dieffenbachia* from Brazil, exhibited by W. Wilson Saunders, Esq.; to *Hæmanthus cinnabarinus* from S. Rucker, Esq.; and to *Calamus intermedius*, an elegant pinnate Palm with spiny stems, from Mr. W. Bull.

AUGUST 17.

A grand specimen of *Lilium auratum* was the leading feature of this Meeting. It came from the garden of Lady Ashburton, Melchet Court, was 8 or 10 feet high, with numerous stems, and bore about 150 flowers. It was deservedly recommended for a Lindley Medal. Mr. Bull made an interesting display of Cycads, and First-class Certificates were awarded to the following:—*Macrozamia excelsa*, a thick-stemmed plant in the way of *Zamia spiralis*; *Encephalartus plumosus* and *E. grandis*, both vigorous-growing sorts, with spiny-toothed leaflets. The same award was made to the new monster Aroid introduced by Dr. Seemaun, and since named *Godwinia gigas*. Other First-class Certificates were on this occasion given to *Euonymus japonicus flavesceus* from Mr. W. Paul; to an elegant climbing *Asparagus* from W. W. Saunders, Esq.; to *Ageratum Imperial blue*, a close habit and free-blooming bedding plant of great merit from Mr. W. Chater.

SEPTEMBER 7.

Messrs. J. and C. Lee obtained a First-class Certificate for *Adiantum Capillus-veneris magnificum*, a greenhouse variety almost equalling *A. farleyense*, being of remarkably vigorous growth, with drooping habit and

large beautifully fringed and crispy pinnules. Mr. Parsons obtained similar awards for two forms of *Lastrea Filix-mas*—one, called *ramosissima*, densely ramose and cristate, the other *parvula*, a remarkable miniature ramose form. First-class Certificates were also given to *Ivy-leaved Pelargonium* (*Lady Edith*), a fine magenta rose of improved quality, and also to *Verbena* (*Countess of Radnor*), from Mr. Echford; and to *Rose Clémence Raour*, a large white flower, mottled with pink, and remarkably sweet, from Messrs. Lee. The Rare-plant Medal was awarded to W. Wilson Saunders, Esq., for scarce and curious, though small-flowered, *Restrepia antennifera*, the flowers of which resemble an antennæ-bearing insect.

SEPTEMBER 21.

First-class Certificates were awarded to *Cupressus Lawsoniana albo-spica*, a shrub of elegant habit, with whitish-coloured twigs, from Messrs. J. and C. Lee; *Hydrangea paniculata grandiflora*, with large paniced flower-heads, from Messrs. Cripps and Son; *Agave pectinata*, from W. W. Saunders, Esq.; *Centaurea hybrida*, a silver-leaved bedding plant, more finely cut than *C. candidissima*, from Mr. Salter; *Pelargonium Willsii*, one of the ivy-leaved varieties, with rose-coloured flowers, from Mr. Wimsett; *Veronica Blue Gem*, a dwarf, shrubby, free-blooming plant, from Mr. Warren; and *Viola Perfection*, with large mauve-coloured flowers, twice the size of those of *V. cornuta*, from Mr. J. Jobson. Awards were also made to the following *Dahlias*:—*Royalty*, from Mr. Rawlings, *Provost*, from Mr. Turner, both First-class; *Alice Gair*, from Mr. Turner, and *Lord Weymouth*, from Mr. Rawlings, both Second-class.

OCTOBER 5.

First-class Certificates were awarded to *Anæctochilus Ordianus*, with deep bottle-green leaves, marked with silvery veins; *A. Dawsonianus pictus*, a form of this dark olive-green coppery-veined Orchid, more reticulately marked than in the form originally shown; *Tydea Nero*, a fine crimson black-spotted variety; *Rhododendron Lobbianum*, a whorled-leaved Bornean species, with long-tubed, curved, crimson flowers; *Seaforthia Veitchii*, a fine, elegant, pinnate Palm, from Australia; and *Miltonia Warscewiczii*, a fine Orchid with a rich purple white-edged lip, all from Messrs. Veitch and Sons; *Deckeria nobilis*, an elegant pinnate Palm, with very spiny stems; *Martinezia caryotæfolia*, *Plectocomia elongata*, *Ptychosperma Alexandræ*, *Ptychosperma elegans*, and *Thrinax Havanaensis*, all handsome acquisitions amongst Palms, and all from Mr. W. Bull; *Cupressus Lawsoniana pendula alba*, a graceful, pendulous, silvery-leaved, evergreen shrub, from Messrs. Paul and Son; *Pelargonium (ivy-leaved) compactum*, a close-growing white-edged variety, of the ivy-leaved race; and *Tropæolum ochroleucum*, a clear yellow-leaved dwarf sort, suitable for beds and ribbon borders, both from Mr. Turner. A well-bloomed plant of the old *Amaryllis reticulata* came from the garden of Lord Egerton of Tatton.

OCTOBER 20.

A very curious dwarf variety of *Athyrium Filix-femina*, named *Elizabethæ*, was shown by Mr. Moore, of Chelsea, and received a First-class Certificate. It was one of several similar seedlings selected from a crop of *A. F.-f. caudigerum*, and was remarkable for its short stiff fronds, set shuttlecock fashion, having the rachis irregularly dilated, so as to bear

some resemblance to a narrow Elk's horn, and the pinnæ irregularly incispinnatifid, with a confluent costal venation. A similar award was made to *Odontoglossum Rossii Warnerianum*, from W. Marshall, Esq. A remarkable specimen of *Vanda cærulea*, in the most perfect health, and bearing three fine spikes of flowers, from the collection of Lord Londesborough, was awarded the Lindley Medal.

FRUIT COMMITTEE.

JULY 6, 1869.

Mr. Rivers sent a collection of dwarf Apple-trees grafted on the Non-such English Paradise stock, to show their productive habit, which was fully confirmed by the fruitfulness of the specimens. The stock was raised from seedlings of the Old Nonsuch.

July 20.—At Manchester the display of fruit was very fine, and amongst the most interesting specimens pot-vines and fruiting-canes from Mr. Meredith, to show the wonderful effect of his vine-manure upon growth, and a fine set of Fig-trees from the Society's Gardens at Chiswick, where their cultivation is very successful, and the collection very rich. Mr. Thompson, of Dalkeith, also sent a collection to show the advantage of using bottom heat in Vine-culture.

August 3.—A Special Certificate was awarded to Messrs. Rivers for a collection of Dwarf Apple-trees, two years old, bearing a very large crop, grafted on the broad-leaved English Paradise stock. An excellent variety of Black Currant, called Lee's Prolific, came from Clevedon, which was highly approved, and received a First-class Certificate.

August 17.—There was a large and interesting collection of fruit. A First-class Certificate was given to a Plum, called Dry's Seedling, oval, of a light purple tint, early, and of excellent flavour, and to a fine Seedling Raspberry, from Mr. M'Laren, extremely vigorous, fertile, and large-fruited. Mr. Pearson exhibited a quantity of Grapes, the produce of the Strawberry Grape, crossed with other varieties, some of which were promising.

September 7.—Messrs. Carter sent 50 lbs. of the American Early Rose Potato, the produce of 1 lb., of sets grown at Forest Hill, respecting the merits of which the opinion of the Committee was deferred, with a view to comparison with other varieties at Chiswick.

September 21.—The great point of interest was the splendid collection of Potatoes from Mr. Fenn. A cross between Early Emperor, a large red kind, ♂, and Fenn's Onwards (white), ♀, produced 36 distinct varieties, one of which was not distinguishable from wild potatoes from Peru. A cross between Hogg's Early Coldstream, ♂, and Stratford Seedling, ♀, gave 24 varieties of Rounds and Kidneys; there were also specimens illustrative of the effect of grafting. One end of the produce was smooth, like the Milky White, the other rough, like the Old Fluke. A First-class Certificate was given to one of his new varieties, called the Rector of Woodstock. Mr. Fenn also sent samples of British wine made from grapes; that from the Royal Muscadine was pronounced excellent, and received a First-class Certificate. The same award was given to a peculiarly good Green-fleshed Melon, sent by Mr. Gilbert, called the Burghley Green Flesh.

October 9.—There was a very large collection of Fungi, Fruit, and Vegetables, amongst the most interesting of which were specimens of Fungi prepared in a peculiar way for museums by Mr. English, of Ep-

ping, who obtained the First Prize, given by Mr. Wilson Saunders, the second, by Mrs. Lloyd Wynne, being awarded to Mr. W. G. Smith, and the third, by Lady Dorothy Neville, to Mr. Hoyle, of Reading.

October 19.—W. Locke, Esq., sent a curious shoot of the Citronelle Grape, in which black, white, and piebald berries appeared on the same bunch. P. L. Hinds, Esq., sent a fine fruit of the Avocado Pear, which has been fruited for the first time in this country. Mr. Carr, his gardener, was highly commended for its production.

GENERAL MEETING.

JULY 6, 1869.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

Major Trevor Clarke called attention to a Pelargonium with crisped edges, named Empress, to a Dark-leaved Azalea, and a fine collection of Cape Orchids from Messrs. Henderson, of which charming tribe Sir John Herschel was said to be the most successful cultivator. *Lycoperdon giganteum*, sent by Messrs. Carter, then came under discussion, cooked slices of which were handed round and pronounced excellent. The Chairman then referred to *Monstera deliciosa*, of which the flavour is extremely pleasant; but the abundance of prickly processes it contains diminish its value. Mr. Bateman addressed the Meeting on the Coco de Mer and the Orchids on the table, especially a new Mormodes, from the Chairman.

AUGUST 3.

G. F. WILSON, Esq., in the Chair.

Attention was directed to *Triteleja laxa*, from Mr. Henderson, and to the genus *Cyclobothria*, which, though difficult of cultivation, was strongly recommended to the notice of cultivators as containing objects of great beauty and interest. *Leea excelsa*, a plant closely related to the Vine, was then noticed, and a specimen, from the Bishop of Winchester, of *Dendrochilum filiforme*, bearing 10,000 blossoms. *Trichotomia ferox*, from Mr. Wilson Saunders, was pointed out as an object of interest, which, it was believed, had flowered for the first time in this country; a much larger specimen, however, appeared at the Hamburg Show. Eggs of a species of *Hemerobius*, greatly resembling a Fungus, were commented on. The seeds sent out by the Society as a Gherkin from the West Indies proved to be *Cucumis Anguria*, distinguished from *C. Prophetarum* by its mild, not bitter, taste, and smooth leaves, besides other points. Cases of monstrosity also were pointed out, which would have been submitted to the Scientific Committee, had it been sitting, and especially a tumour on Vine shoots, which was evidently referable to a metamorphosed raceme, and a Phlox, which, on the same plant, produced bracts instead of petals, and leaves with a reversed lobe from the underside of the midrib.

AUGUST 17.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

The special attraction of the Meeting was a wonderful specimen of *Lilium auratum* from the Dowager Lady Ashburton, and the gigantic Aroid from Mr. Bull. A fine specimen of a new South-African climbing

species of *Asparagus* was pointed out as a very useful decorative plant for the Conservatory, and the curious *Methonica aurea*.

SEPTEMBER 7.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

The Chairman called attention to a new hybrid Ivy-leaved Pelargonium from Mr. Eckford, as likely to be useful in hybridization, as a means of raising a good purple-flowered variety, which would be highly effective; to *Vallota purpurea*, as an admirable plant for window-culture; and to Messrs. Lee's new highly-scented Rose, Clémence Raoux.

SEPTEMBER 21.

J. RUSSELL REEVES, Esq., F.R.S., in the Chair.

A fine collection of Conifers in fruit (many of which had been rich in cones this year in consequence of the ripening of the wood in 1868) was sent by Mr. Cox, and amongst them a very obtuse-leaved *Picea* referred to *P. cephalonica*. That is, however, considered a variety of the common Silver Fir by Parlature, and we may therefore expect much difference in the leaves. A paper was read by Mr. Berkeley from Mr. Fenn relative to his experiments on Potatos, which will be given in the Journal.

Mr. Wilson pointed out some nuts which had been perforated on either side by Field-mice.

OCTOBER 5.

J. BATEMAN, Esq., F.R.S., in the Chair.

Mr. Berkeley commented on the Fungi exhibited at the Meeting, and read the interesting communication from Dr. M. A. Curtis, which appears in this Journal.

The Chairman then produced ripe Mangos, from Madeira, which he had purchased in Covent Garden Market.

OCTOBER 12.

J. BATEMAN, Esq., F.R.S., in the Chair.

The Chairman stated, with respect to the Avocado Pear, *Persea gratissima*, that in appearance and flavour it strongly resembled a dark-green Vegetable Marrow, and was improved by being eaten with pepper and salt. Permanent ink is sometimes made from its solitary astringent seed. He remarked, with reference to the culture of *Pleione*, that it liked damp and heat when growing, and the reverse when at rest. Lord Londesborough's wonderful specimens of *Vanda cærulea* were justly lauded. It was grown in the corner of a house facing north-east, where it had plenty of light. Finally, *Cypripedium Reichenbachianum* was noticed, as it has sometimes forty blossoms expanded at once.

FLORAL COMMITTEE.

Nov. 16, 1869.

A First-class Certificate was given to *Litobrochia undulata*, a fine Fern from Mr. Bull, to which, on a former occasion, only a Second-class has been awarded; also to *Maxillaria splendens*, from Mr. Linden, with white petals and sepals and bright-orange lip with rosy-tipped edges; also to *Siphocampylus Humboldtiana* from Mr. Wilson Saunders, and *Sarcanthus bigibbus*, with lemon-coloured petals and orange and white lip. Some very promising Pelargonias were sent by Mr. Laing, amongst which *Georgie Peabody* was conspicuous, with rich scarlet extremely broad flowers.

FRUIT COMMITTEE.

Nov. 16, 1869.

A First-class Certificate was given to a large smooth-skinned Kidney Potato, named Beaconsfield, from Mr. Turner.

A mammoth Gourd, weighing 124 lbs., came from the Industrial School, Feltham, grown by the boys of the Institution.

A yellow Capsicum came from Sandringham, supposed to be a seedling from a West-Indian variety, but more dwarf in growth. We have seen the same variety in cultivation in Wales, where it is highly approved. The Saugor Pepper is made from a closely allied form.

Mr. Shepherd sent some Calville Blanc Apples, from small trees on the Paradise stock, which were much commended.

Mr. Whibly sent from Sheffield bunches of Trebbiano Grape in-arched on a wild American stock, which were interesting from being grown entirely out of doors.

SCIENTIFIC COMMITTEE.

Nov. 16, 1869.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

The Minutes of the last Meeting were read and approved.

Mr. Berkeley brought Walnuts from Sibbertoft, 500 feet above

the level of the sea, which had become black and shrivelled in the night of the severe frost of Tuesday, October 19. Every Walnut on the tree was in the same condition. Mr. Glaisher remarked that their condition was probably due to dryness of the atmosphere accompanying the frost. The temperature was usually considerably warmer 20-50 feet above the surface. Prof. Ansted called attention to the effect of wind in blackening the leaves on one side, while on the unexposed side they retained their green colour. Neither the walnuts nor leaves in question fell till a later period. Mr. Berkeley stated that this could not be the case, unless they were forced off by the wind, till a solution of continuity was caused by the development of an intermediate stratum of loose cells.

A letter from Mr. Murray was read in which he stated that the insect in the Orchid shoots sent on two previous occasions was undescribed, and probably from Central America, though closely allied forms occur in North America.

Dr. Masters reported on the progress of the experiments on the effect of various manures on the growth of plants. As they are to be renewed next year, and no trustworthy conclusions can at present be formed, the publication is deferred till the experiments are more matured. Dr. Gilbert remarked that the experiments of the present year merely indicated what was to be done or avoided next season.

Dr. Voelcker corroborated Dr. Gilbert as to the necessity of caution in deducing inferences; and Mr. Glaisher, stating what different effects were produced by the roots of different plants in raising the temperature of the soil, recommended that a thermometer should be plunged in each box, care being taken that the thermometers should be made out of the same pot of glass and filled with the same quicksilver.

A Report was laid on the table relative to the experiments at Chiswick on the effect of grafting on different stocks. As, however, an amended Report is promised by Mr. Barron, the publication is for the present deferred.

A paper by Mrs. Barber on the Cultivation of Aloes was communicated by Dr. Hooker, which will appear in the Journal, with a Note relative to the Chairman's observations on two points contained in the memoir.

A Report from Mr. Moore was then read on the experiments carried on at Chiswick with reference to the effect of various manures on the colouring of bedding Pelargoniums, which will appear in the Journal.

Dr. Masters placed on the table a box of soil sent by Mr. Fish, to show that a dressing of lime was carried gradually down into the soil, in opposition to the views of Mr. Darwin, by the mere superdeposit of carbonaceous matter. Dr. Voelcker, however, remarked, that lime so applied is always washed down gradually; and it was observed that a mere inspection of worm-stalls, where the soil contained little stones, would prove the correctness of Mr. Darwin's statement.

GENERAL MEETING.

Nov. 16, 1869.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

The awards of the Floral and Fruit Committees were announced by the Rev. J. Dix and Mr. G. F. Wilson.

Mr. Berkeley remarked that there was considerable difference in the foliage of *Picea Pinsapo*, as grown in this country, and the herbarium specimens of the variety from Algiers named var. *Baborensis*. Plants of the more normal form, as cultivated, varied with very acute and obtuse leaves. In both the leaves came straight from the branch, but in the Algerian plant the leaves closely resembled those of the common Silver Fir, and were twisted at the base. The Algerian form might therefore be an intermediate species with the leaves of the Silver Fir and the cones of *Pinsapo*, or the three might be forms of one very variable species.

Fruit of the Australian Proteaceous *Macadamia ternifolia* and plants sent by Messrs. Henderson were then pointed out. The nut is peculiarly good and free from all rancidity. The pretty *Coleus barbatus*, a plant extending from India to Abyssinia, came from Chiswick. Mr. Standish's collection of Evergreens was then alluded to, and *Podocarpus coriacea* and *Retinospora obtusa* pointed out as standing the winter, even of New York. Attention was also called to a pretty *Abies* from Japan in the same collection, named provisionally *Abies Japonica*. The Chairman then remarked on the good effect produced by many of these plants for winter bedding, and on the success of Mr. Salter in producing a dwarf condition of the magnificent *Dahlia imperialis*, of which flowering branches were sent from Chiswick, by grafting on the tubers of a liliputian *Dahlia*.

FLORAL COMMITTEE.

DECEMBER 21, 1869.

Messrs. E. G. Henderson and Sons brought a large collection of variegated Ivies, to one of which, with purple-tinted bluntly hastate leaves with overlapping lobes, a First-class Certificate was awarded. Messrs. Veitch brought flowers of *Hippeastrum Leopoldi*, a bold showy flower with claret-crimson greenish-tipped segment, which also obtained a First-class Certificate.

FRUIT COMMITTEE.

The competition for the prizes for Dessert Apples and Pears, offered by the Rev. G. Kemp, was well maintained,—Mr. Garland, gardener to Sir T. Dyke Acland, being first with the Winter Nelis, Glou Morceau, and Bergamot Esperen amongst Pears, and Golden Pippin, Nonpareil, and Ross Nonpareil Apples; Mr. Sidney Ford, gardener to W. E. Hubbard, Esq., second with Knight's Monarch, Duchesse d'Angoulême, and Joséphine de Malines Pears, and Ribston Pippin, Red Pearmain and Blenheim Orange Apples. Lady Dorothy Neville sent a fine dish of Tangerine Oranges from old trees at Dangstein, which were much admired both as regards beauty and flavour; and some very fine home-grown Oranges came from Danesbury Park (W. J. Blake's, Esq.).

SCIENTIFIC COMMITTEE.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

The minutes of the last Meeting were read and approved.

A leaf of *Aerides* with a peculiar form of spot, quite different from the well-known forms of black spot which have so often engaged the attention of the Committee, was laid on the table by the Secretary. The spots are brownish, raised above the general surface, and filled with loose cellular tissue. A box of Peas, from Mr. Laxton, was also handed round, the produce of a single crop, between Ringleader and the Common Maple. The different forms were singularly numerous. Further information was promised by Mr. Laxton for the next Meeting.

A paper on the "Fertilization of Grasses," by Mr. Spruce, was then read, which will be published in the Journal.

The Chairman stated that dead bodies of a fly are sometimes imprisoned in the flowers of *Lolium perenne*, as if in consequence of some deleterious influence.

Mr. A. W. Bennett remarked that it is impossible to predicate of any given family or genus whether its members are self- or crop-fertilized. Many winter-flowering plants are self-fertilized, as, for example, *Poa annua*.

Attention was then drawn to the necessity of making some new arrangements at Chiswick for meteorological observations, towards which Mr. Glaisher kindly offered his assistance. He recommended observations of temperature to be made at several depths, besides 1 foot and 2 feet, and remarked that at 25 feet the temperature was lowest in July, and highest in January. Even though there might be some defect in the old arrangements, such a long series of observations is very valuable.

GENERAL MEETING.

W. WILSON SAUNDERS, Esq., F.R.S., in the Chair.

The awards were announced by the Rev. J. Dix, and Mr. G. F. Wilson.

Mr. Berkeley stated that after careful examination, as far as could be ascertained without the assistance of cones, he believed that the *Abies* from Japan, exhibited by Mr. Standish, is a form of *Abies obovata*, Ledebour, a species with a wide geographical range. He had failed in obtaining fruiting specimens of the sharp-leaved form of *Picea pinsapo*, though there were trees in the country full 25 feet in height. There were other instances, however, in which the sterile tree had very different leaves from the fertile, the most remarkable instance, perhaps, being that of *Picea firma*, Sieb. and Zucc., of which *P. bifida* is the sterile form. A report was then made of the trials at Chiswick of different varieties of Maize, the best of which proved to be Bates's Early Bronze, which seemed to be identical with the variety so successfully cultivated by Mr. Dancer. Some drawings of fruits from Mauritius, brought by Mr. Fernyhough, of Belsize Park, Hampstead, were commented on by Mr. Bate-man, who called especial attention to a charming *Polycychnis* from the Society's Collection, and for which he proposed the name of *P. Reichenbachiana*.

FLORAL COMMITTEE.

JANUARY 19, 1870.

Fine collections of Orchids came from Lord Londesborough, Mr. Parsons, Mr. B. S. Williams, and Messrs Veitch. A collection of cut flowers of Cattleyas was sent by W. Marshall, Esq., of which *C. Trianae*, var. *Io*, *C. Trianae*, var. *Penelope*, *C. Trianae*, var. *Atalanta*, and *C. Trianae*, var. *Venus*, obtained First-class Certificates. Mr. Edmunds, of Hayes, sent *Primula sinensis*, of immense size, to which also a First-class Certificate was awarded. Mr. Welsh sent a rich carmine-rose var. of *Cyclamen persicum*, which obtained the same award. *A. capensis*, *Cissus porphyrophyllus*, with some other interesting plants, were sent by Mr. Wilson Saunders. Messrs. Veitch obtained the prize which was offered for hardy Conifers; while for Ivies the first prize was awarded to Mr. Turner, the second to Mr. W. Paul, and an extra prize was given for a nice group to Messrs. Henderson. A variety of the Common Laurel, *Cerasus lauro-cerasus rotundifolius*, obtained a Second-class Certificate on account of its promising habit.

FRUIT COMMITTEE.

The most interesting object at the Meeting was an imported Pine from Bahia, which far exceeded in flavour those which are usually sent from the West Indies. A fine dish of the fruit of *Solanum betaceum* came from Lord Carrington. Mr. Parsons obtained the first prize for Apples, Mr. Earley the second; Mr. C. Ross the first in Pears, Mr. Hobbs the second. Mr. Meredith sent Grapes in excellent order, which obtained a Special Certificate, as did Muscat of Alexandria, from Lord Harewood, which ripened in September.

GENERAL MEETING.

JAMES BATEMAN, Esq., F.R.S., in the Chair.

In the absence of Mr. Wilson, Mr. Berkeley made remarks on the Pineapple and *Solanum betaceum* (Guisados). The curious processes on the petioles of *Philodendron crinipes* were pointed out as somewhat similar to the foliaceous processes on *Begonia phyllomania*; and some observations were made on the supposed

REDUCTION
OF THE
METEOROLOGICAL OBSERVATIONS

MADE AT THE
ROYAL HORTICULTURAL GARDENS

CHISWICK

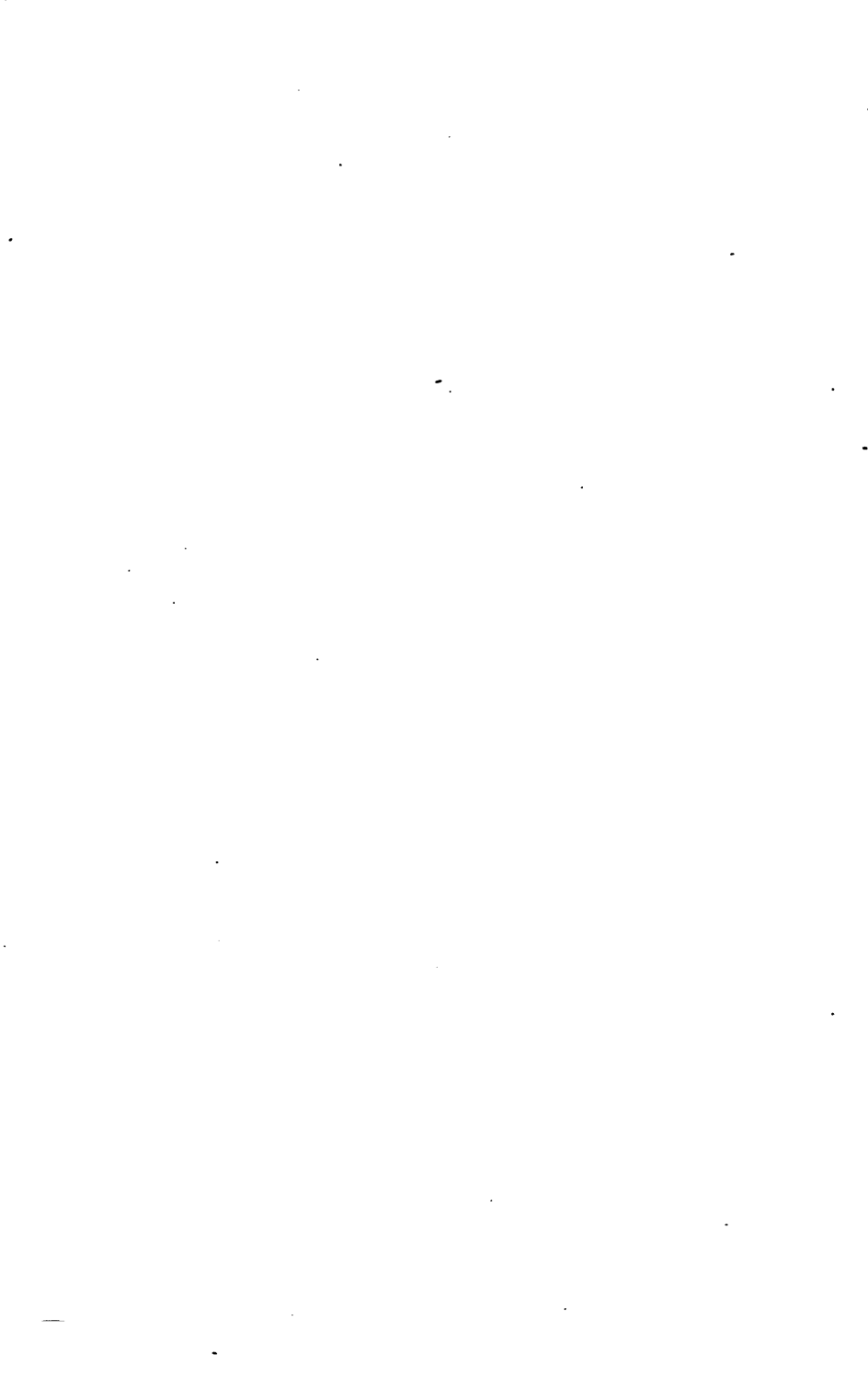
IN

THE YEARS 1826—1869

BY JAMES GLAISHER, F.R.S. &c.

A SUPPLEMENT TO VOL. II. OF THE JOURNAL OF THE
ROYAL HORTICULTURAL SOCIETY OF LONDON, NEW SERIES

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ON THE
MEAN TEMPERATURE OF EVERY
DAY, MONTH, AND YEAR
FROM ALL
THERMOMETRICAL OBSERVATIONS
TAKEN AT THE
HORTICULTURAL GARDENS
AT
CHISWICK

FROM THE BEGINNING OF 1826 TO THE END OF 1869

TEMPERATURE.

ON the 28th of February in the year 1825, the Garden Committee of the Royal Horticultural Society resolved that it was expedient that a Meteorological Journal should be kept at Chiswick in the gardens of the Society; and observations were commenced on the 1st of May, but from the difficulties experienced in obtaining efficient instruments and other circumstances the observations to the end of the year were not considered to be sufficiently perfect for publication.

From the 1st day of January 1826 to the 31st day of December 1869; however, the observations were made upon one uniform plan throughout; till June 1830 by Mr. William Beattie Booth, A.L.S., and from that date, with but few exceptions which are not specified, by Mr. Robert Thompson, under-gardener in the fruit department.

The observations during the whole of this period of 44 years have been made at three different times in the day, designated in the journals as morning, noon, and night; and included the readings of the barometer, temperature of the air and either a Daniell's hygrometer or a wettened-bulb thermometer as well as maximum and minimum temperatures with solar and terrestrial readings, fall of rain, direction and strength of the wind by estimation, and brief notes.

The morning observations are stated to have been made at 6 o'clock in the summer months, and at daybreak in the winter months; the noon observation was made between noon and 1 P.M., and the night observation between the hours of 9 P.M. and 10 P.M.

In the reduction of the observations I have considered the morning observation to have been made at 6 o'clock A.M. in the months of April to August; at 6.30 A.M. in the months of March, September and October; at 7 A.M. in the months of February and November; and at 8 A.M. in the months of January and December; that the noon observations have been made midway between noon and 1 P.M., and the night observations at 9.30 P.M. throughout the year.

Considering that temperature is the most important meteorological element bearing upon all animal and vegetable life, and also considering that the science of open-air horticulture needs a full knowledge of the

extremes and means of climatic temperature; the horticulturist having to contend with so great a difference in the distribution of temperature at the same season in different years, that it is of the first importance to determine accurately the average of temperature of every day in the year, with the extremes to which it is liable. It is known that the least disturbance of the animal economy takes place when the mean temperature of the air is that of the average of the season, and the greatest disturbances take place whenever the temperature of the air departs the greatest, either above or below that average; and there is no doubt that the same general law affects all vegetation in a similar manner, and that the effect follows the cause after an interval of time. It was these considerations which induced me to confine my first reduction of this long series of observations to temperature alone.

The instruments used were:—

A Daniell's hygrometer, and maximum and minimum thermometers of Rutherford's construction made by Newman. (These thermometers were placed in an open spot in the Arboretum, screened from the rays of the sun and sheltered from radiation by a kind of umbrella of oiled cloth; they were attached to the northern side of the post which supported the umbrella, and are four feet above the ground.—See page 100, Vol. vii. *Trans. Hort. Soc.*)

There is no record of change of instruments. The scale used was that of Fahrenheit, except in the years 1835, 1836, and 1837, when the centigrade scale was used.

Till the year 1844 there are no MSS. observations, but the observations are published *in extenso* in the *Transactions of the Royal Horticultural Society*. From the year 1845 the observations are in MSS.

The first process in the reduction of the observations was, day by day, to see that the several thermometrical observations in the day were less than the maximum and greater than the minimum, and to note all discordant readings.

The second step was to examine these discordant readings; for this purpose all the observations made at the Royal Observatory, Greenwich, on that day were consulted, for readings taken at about the same times, and to determine the general course of increasing and decreasing readings, and amount of change. A great many errors were thus found, principally in the readings of the minimum thermometer.

The third process was to take the daily sums and means of the three observations of morning, noon, and night temperatures, for a first approximation of mean daily temperature.

The fourth was to take the daily sums and means of the maximum and minimum temperatures, for a second approximation to mean daily temperature.

The fifth was to take the daily differences between the maximum and minimum temperatures, for daily range. Next to deduce from each of these approximate true mean daily values, by the application of corrections as calculated from my Tables of Diurnal Range.

The corrections to be applied to the mean of the three daily observations were as follows (dependent on the time of the year, the times of observation, and the daily range of temperature):—

In January	when the daily range was	7	the correction was	0.1	subtractive
" "	" "	30	"	0.7	"
" February	" "	7	"	0.1	additive
" "	" "	36	"	0.4	"
" March	" "	1	"	0.1	"
" "	" "	10	"	0.7	"
" "	" "	20	"	1.4	"
" "	" "	30	"	2.0	"
" April	" "	1	"	0.1	"
" "	" "	10	"	0.7	"
" "	" "	20	"	1.3	"
" "	" "	30	"	1.9	"
" "	" "	40	"	2.5	"
" May	" "	2	"	0.1	"
" "	" "	20	"	0.6	"
" "	" "	30	"	0.8	"
" June	" "	10	"	0.1	"
" "	" "	40	"	0.4	"
" July	" "	6	"	0.1	"
" "	" "	40	"	0.6	"
" August	" "	1	"	0.1	"
" "	" "	10	"	0.4	"
" "	" "	20	"	0.7	"
" "	" "	30	"	1.1	"
" "	" "	40	"	1.5	"
" September	" "	2	"	0.1	"
" "	" "	10	"	0.5	"
" "	" "	20	"	1.1	"
" "	" "	30	"	1.7	"
" "	" "	40	"	2.2	"
" October	" "	1	"	0.1	"
" "	" "	40	"	0.6	"
" Nov. and Dec.	" "	1	"	0.1	subtractive
" "	" "	30	"	0.4	"

These corrections were applied daily to the mean of the three daily observations to determine the true mean daily temperature throughout the whole times, excepting the three years when the centigrade scale was unfortunately used. I say unfortunately, for the observations were made to the whole degree only, and thus the error of reading was frequently as large as 1° Fah. A mean correction belonging to each

month was thought sufficient during these three years. The next process was to apply a correction daily to the mean of the maximum and minimum temperatures, dependent upon the time of year, to deduce from these a second approximation to the true mean daily temperature, and which corrections are as follows:—

From January		1 to January	7 the correction was	0	0.1 subtractive
"	"	8 " "	22	"	0.2 "
"	"	23 " February	5	"	0.3 "
"	February	6 " "	18	"	0.4 "
"	"	19 " "	25	"	0.5 "
"	"	26 " March	1	"	0.6 "
"	March	2 " "	4	"	0.7 "
"	"	5 " "	8	"	0.8 "
"	"	9 " "	13	"	0.9 "
"	"	14 " "	16	"	1.0 "
"	"	17 " "	22	"	1.1 "
"	"	23 " "	29	"	1.2 "
"	"	30 " April	5	"	1.3 "
"	April	6 " "	12	"	1.4 "
"	"	13 " "	19	"	1.5 "
"	"	20 " May	1	"	1.6 "
"	May	2 " "	30	"	1.7 "
"	"	31 " June	30	"	1.8 "
"	July	1 " July	25	"	1.9 "
"	"	26 " August	8	"	1.8 "
"	August	9 " "	21	"	1.7 "
"	"	22 " "	29	"	1.6 "
"	"	30 " September	5	"	1.5 "
"	September	6 " "	11	"	1.4 "
"	"	12 " "	19	"	1.3 "
"	"	20 " "	28	"	1.2 "
"	"	29 " October	10	"	1.1 "
"	October	11 " "	20	"	1.0 "
"	"	21 " "	26	"	0.9 "
"	"	27 " "	31	"	0.8 "
"	November	1 " November	3	"	0.7 "
"	"	4 " "	8	"	0.6 "
"	"	9 " "	13	"	0.5 "
"	"	14 " "	17	"	0.4 "
"	"	18 " "	23	"	0.3 "
"	"	24 " December	1	"	0.2 "
"	December	2 " "	11	"	0.1 "
"	"	12 " "	24	"	0.0 "
"	"	25 " "	31	"	0.1 "

By the application of these numbers a second mean daily temperature was formed.

The next process was to compare the daily results deduced from the three observations with that found from the maximum and minimum

temperatures—the two results should be alike, or nearly so; and when this was not the case, to note all instances of discordance.

Then to examine a second time all Greenwich records on those days, to trace the source of discordance; the errors thus found were mostly belonging to the morning or noon observations.

The last step was to combine the results found by the two methods together, for the determination of the most probable mean temperature of every day, as found from all the observations taken that day, and in this way Tables I. to XII. were formed.

The numbers in the first column are the days of the month, those in the following forty-four are the mean temperatures of the same day of the month in the successive years; the forty-sixth column contains the mean temperature of every day, as deduced from the forty-four years observations, and each value, therefore, is based upon about 220 observations, spread equally over the period. The remaining columns contain the highest and lowest mean daily temperatures within the periods, and the last column the difference between them.

The numbers in the bottom line are the means of all the numbers in the columns above them, and therefore are the mean temperatures of each month; each result is based upon 150 observations nearly; the whole number of observations treated of in this paper exceed 80,000.

*taken on that years 1826-1869;
For every day*

DAY OF THE MONTH	A R Y.				MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
	18	1851	1852	1853		Lowest	Year	Highest	Year	
1	4	52.4	30.2	50.0	37.5	25.8	1836	52.4	1851	27.1
2	3	49.6	35.6	48.5	36.2	19.9	1867	49.5	1851	29.6
3	2	44.0	39.6	44.2	36.2	21.9	1867	49.7	1860	27.8
4	2	43.4	39.6	47.4	37.0	10.9	1867	47.5	1866	36.6
5	2	39.2	37.1	45.2	36.4	22.1	1864	49.9	1844	27.8
6	2	37.7	41.5	41.2	35.8	16.8	1864	48.2	1834	31.4
7	2	45.0	43.2	42.8	35.9	16.9	1841	49.5	1867	32.6
8	2	39.9	41.5	41.8	36.1	14.0	1841	50.3	1869	36.3
9	2	35.8	34.0	42.0	36.0	19.4	1861	48.7	1862	29.3
10	2	43.9	32.4	47.8	36.9	15.6	1861	47.5	1853	31.9
11	2	47.3	46.4	46.8	36.9	20.4	1838	49.6	1835	29.2
12	2	48.6	46.1	49.4	37.0	17.6	1838	49.4	1853	31.8
13	2	47.0	43.6	44.4	37.3	20.2	1867	50.8	1849	30.6
14	2	44.7	45.4	40.7	37.1	19.4	1838	49.3	1866	29.9
15	1	45.7	50.9	44.1	36.1	15.0	1838	50.9	1852	35.9
16	1	43.2	45.3	39.4	36.7	19.1	1826	48.9	1834	29.8
17	2	44.2	42.4	37.4	37.6	22.5	1830	48.5	1841	26.0
18	2	39.4	33.8	35.4	37.1	22.7	1830 1838	51.5	1828	28.8
19	2	42.2	38.0	44.4	37.5	17.4	1838	53.5	1828	36.1
20	2	44.5	44.5	49.1	37.3	7.7	1838	50.7	1828	43.0
21	2	45.3	43.4	42.7	37.7	23.2	1855	50.1	1866	26.9
22	2	38.5	39.9	39.0	38.3	24.5	1827	49.2	1828	24.7
23	2	35.0	37.3	40.2	38.8	22.9	1829	54.6	1834	31.7
24	2	30.6	42.1	39.0	38.2	24.5	1829	52.5	1834	28.0
25	2	35.4	41.3	37.1	38.8	25.1	1829	53.3	1846	28.2
26	2	36.3	39.7	36.2	38.8	24.4	1848	51.4	1834	27.0
27	2	37.6	41.6	36.1	38.7	25.5	1855	52.1	1867	26.6
28	2	41.6	36.3	39.9	38.6	22.9	1848	51.0	1843	28.1
29	2	48.1	36.2	39.6	38.8	23.4	1857	51.7	1843	28.3
30	4	40.5	41.2	40.0	38.9	26.1	1839	49.2	1854	23.1
31	4	38.9	41.9	35.0	39.0	23.2	1830	53.2	1869	30.0
Means	34	42.1	40.4	42.2	37.4					

The M
The M
The d
Jan
7

The day of the year 1838 its Mean Temperature was
70.7; and
The day of the year 1839 its Mean Temperature was 26.1;
and in the

ltural Society at Chiswick in the years 1826-1869;

1863	1864	1865	1866	1867	1868	1869	MEANS OF 44 YEARS.	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY.
								Lowest	Year	Highest	Year	
43.7	41.7	44.5	51.2	46.8	48.2	48.8	39.0	23.5	1830	51.6	1850	28.1
48.0	47.2	44.8	45.6	42.0	46.1	39.2	38.9	20.6	1830	50.4	1850	29.8
43.3	45.5	42.5	41.5	39.0	40.5	49.9	38.4	21.5	1841	49.9	1869	28.4
41.7	36.1	35.3	44.8	41.7	41.4	50.7	39.5	26.3	1841	53.2	1862	26.9
46.4	32.1	36.1	45.9	43.2	44.2	49.5	40.5	19.9	1830	50.8	1848	30.9
48.0	32.0	39.7	51.4	42.3	40.3	46.6	40.2	19.7	1830	52.5	1854	32.8
48.9	25.6	45.5	46.1	40.9	43.7	50.9	40.6	25.2	1841	51.2	1856	26.0
42.1	31.5	38.0	43.5	48.4	37.3	51.4	39.9	26.0	1862	54.4	1831	28.4
38.3	27.4	33.0	47.0	47.7	35.1	47.4	39.2	21.1	1847	56.1	1831	35.0
42.6	29.1	31.7	44.2	50.2	45.8	49.7	38.4	21.0	1855	51.6	1831	30.6
43.3	34.6	26.1	42.6	43.9	43.0	50.1	38.1	23.5	1855	51.3	1833	27.8
39.6	40.4	29.3	40.2	48.7	37.9	43.5	38.1	15.8	1845	49.8	1831	34.0
36.8	46.8	27.6	34.6	47.6	41.0	41.2	37.6	24.0	1855	48.8	1848	24.8
39.2	44.0	28.7	36.4	44.7	45.2	47.3	38.3	26.4	1838	50.9	1848	24.5
42.1	48.1	23.8	39.2	46.5	39.5	45.7	39.5	23.8	1865	52.5	1850	28.7
33.0	42.3	32.8	43.1	50.6	36.2	48.6	39.5	25.2	1855	51.0	1859	26.8
34.7	37.0	33.7	33.0	45.7	39.3	48.0	39.0	20.2	1855	51.6	1852	31.4
37.7	33.0	39.4	31.8	44.7	44.6	44.6	38.7	16.3	1855	50.5	1851	34.2
42.6	28.3	33.5	33.0	48.9	43.4	42.2	38.5	23.5	1855	49.4	1862	26.9
41.2	28.2	31.5	34.7	49.2	42.1	42.3	38.4	23.0	1855	50.7	1862	27.7
42.0	29.5	33.5	37.8	47.7	48.6	41.9	39.5	22.4	1855	48.6	1868	26.2
43.0	29.0	40.0	40.3	48.5	45.0	34.2	40.0	25.5	1855	48.6	1846	23.1
44.5	28.5	45.2	41.5	43.4	40.4	36.9	39.3	28.5	1864	53.3	1846	24.8
44.6	32.8	42.0	40.6	44.8	50.4	40.2	40.2	30.9	1860	53.6	1846	22.7
42.6	34.0	39.4	42.0	46.3	50.7	42.7	40.6	31.3	1858	52.0	1830	20.7
46.3	36.9	41.9	38.9	42.1	50.1	46.6	40.3	30.1	1858	53.1	1828	23.0
45.7	38.4	42.4	34.4	38.7	46.1	44.4	41.3	31.9	1847	54.7	1828	22.8
43.4	39.4	46.3	31.6	34.7	49.5	40.6	41.1	31.3	1853	52.9	1846	21.6
...	38.9	...	...	...	45.3	...	...	...	...	...	...	...
42.3	35.8	36.7	40.6	45.0	43.5	45.2	39.4					

to the greatest difference was the 9th; in the year 1847 its Mean Temperature was 35°0.
the least difference was the 25th; in the year 1858 its Mean Temperature was 31°3,
bers is 20°7.

on that day at the years. 1826-1869;
every day within

DAY OF THE MONTH						MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
	1851	1852	1853	1854	1859		Lowest	Year	Highest	Year	
1	45.8	41.8	32.3	37.5	48.6	41.1	31.7	1858	51.6	1846	19.9
2	50.7	37.6	37.3	37.6	42.2	42.3	29.7	1862	51.5	1831	21.8
3	46.9	33.4	33.7	37.2	36.7	41.8	31.0	1858	52.8	1846	21.8
4	46.7	32.0	38.2	38.0	34.6	41.3	27.7	1845	51.8	1831	24.1
5	44.8	32.5	44.5	38.7	45.2	41.0	26.9	1845	53.1	1834	26.2
6	44.5	35.0	49.3	34.0	41.5	41.2	27.0	1845	51.8	1862	24.8
7	52.3	39.9	45.7	39.5	34.3	41.2	30.3	1839	53.5	1862	23.2
8	52.2	41.6	42.7	50.5	33.1	41.3	29.8	1839	52.7	1826	22.9
9	54.3	41.6	43.7	54.5	38.5	40.6	29.9	1839	55.3	1826	25.4
10	54.8	38.5	45.0	48.8	35.1	40.7	29.9	1855	53.6	1826	23.7
11	44.0	40.1	43.9	49.7	35.6	41.2	26.5	1847	53.2	1830	26.7
12	44.9	38.5	43.2	46.6	35.7	41.7	32.1	1845	53.3	1859	21.2
13	44.8	40.0	48.9	53.4	35.2	42.6	20.3	1845	54.6	1828	34.3
14	44.4	40.5	42.8	49.8	35.6	43.0	25.8	1845	52.6	1828	26.8
15	44.7	39.6	42.1	48.1	36.0	42.5	30.2	1845	53.9	1828	23.7
16	34.9	44.5	37.0	48.7	35.0	43.3	27.3	1845	55.9	1828	28.6
17	34.2	41.0	30.2	39.6	37.0	41.9	28.9	1845	53.4	1828	24.5
18	34.1	38.2	27.9	43.0	40.3	41.9	27.9	1853	52.3	1828	24.4
19	42.3	41.0	31.2	39.3	43.4	42.8	31.2	1853	52.0	1836	20.8
20	41.7	41.7	34.9	38.8	38.6	43.0	29.8	1865	54.9	1836	25.1
21	42.4	45.6	35.2	40.2	39.7	42.7	31.5	1837	53.0	1830	21.5
22	36.0	52.3	34.3	41.8	40.4	42.7	31.3	1837	54.2	1843	22.9
23	36.2	47.4	32.3	42.5	36.1	42.6	31.5	1837	51.7	1848	20.2
24	36.9	46.3	30.2	42.5	39.4	42.4	30.2	1853	53.3	1843	23.1
25	36.5	41.0	30.9	41.8	40.8	42.4	30.9	1853	54.3	1862	23.4
26	36.5	39.9	32.1	47.5	41.3	42.9	32.1	1853	54.2	1830	22.1
27	37.2	37.2	39.8	43.4	35.6	44.4	32.2	1850	54.0	1830	21.8
28	44.6	38.1	38.3	49.4	36.7	44.5	34.6	1850	53.3	1842	18.7
29	44.9	48.9	37.0	47.5	36.4	44.0	35.2	1865	56.3	1866	21.1
30	36.0	51.6	43.7	49.2	37.4	44.4	36.2	1859	52.5	1848	16.3
31	36.4	44.2	48.7	45.5	40.8	45.1	34.7	1847	55.9	1848	21.2
Means	42.1	41.0	38.6	44.0	38.1	42.4					

The M	The day of the month; in the year 1845 its Mean Temperature was
The M	20° 3; and in the year 1846 its Mean Temperature was 20° 3
The di	The day of the month; in the year 1859 its Mean Temperature was 36° 2;
in 44	and in the year 1844 its Mean Temperature was 36° 2
T	

Natural Society at Chiswick in the years 1826-1869;

								MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
2	1863	1864	1865	1866	1867	1868	1869		Lowest	Year	Highest	Year	
7	44.1	44.7	45.9	42.7	52.8	48.2	40.5	45.4	35.0	1838	56.1	1848	21.1
6	45.1	43.2	44.7	43.1	54.5	47.9	44.2	46.0	34.7	1829	59.7	1835	25.0
1	47.2	46.0	45.9	43.4	53.7	50.8	41.1	46.7	33.2	1839	59.0	1848	25.8
5	47.8	55.6	44.2	42.7	50.7	48.7	40.0	47.1	34.1	1839	59.1	1848	25.0
3	44.2	38.2	51.4	46.6	51.6	53.2	47.9	47.6	35.7	1839	57.6	1832	21.9
7	51.1	44.1	54.3	48.1	53.9	55.0	44.6	48.1	34.5	1839	60.5	1859	26.0
1	46.6	45.9	55.3	44.1	50.9	54.9	53.7	48.1	38.7	1839	63.0	1859	24.3
3	48.9	47.4	52.9	48.0	47.9	45.2	53.9	47.1	37.0	1839	58.0	1830	21.0
7	53.6	53.3	50.6	42.9	48.9	40.7	45.2	46.2	36.0	1837	57.9	1835	21.9
1	55.1	54.1	55.6	47.3	47.9	40.2	54.6	46.6	33.6	1837	55.6	1865	22.0
9	53.0	51.6	50.1	50.1	46.9	41.5	59.1	46.7	35.6	1837	59.1	1869	23.5
1	53.1	49.6	52.5	53.5	47.9	37.3	58.4	47.3	32.1	1862	58.4	1869	26.3
6	50.6	38.0	54.8	53.1	50.3	44.0	57.6	46.5	35.6	1862	58.1	1831	22.5
4	49.7	48.3	52.2	49.4	50.2	43.7	63.3	48.0	38.8	1837	63.3	1869	24.5
5	49.5	56.6	47.3	52.1	51.6	49.1	53.9	48.6	33.5	1862	59.0	1826	25.5
5	53.5	46.0	57.3	50.4	50.3	52.5	49.8	48.3	36.9	1837	60.3	1858	23.4
5	55.8	49.7	56.5	51.0	54.8	53.9	47.3	48.2	36.4	1849	56.5	1865	20.1
7	52.4	49.7	55.5	52.3	56.8	49.4	46.1	48.7	38.4	1859	56.8	1867	18.4
43	50.0	56.8	54.6	53.8	58.3	51.4	49.3	48.6	35.3	1849	60.9	1854	25.6
7	53.3	56.9	51.4	48.0	51.4	51.9	49.8	49.2	36.6	1849	63.3	1854	26.7
9	51.3	58.1	58.7	53.7	46.4	54.6	54.6	49.4	38.4	1849 1860	59.6	1854	21.2
9	53.3	52.5	60.4	47.9	52.0	54.9	51.0	49.7	38.3	1860	60.4	1865	22.1
3	49.5	51.4	56.2	47.3	55.5	53.8	54.8	49.5	39.0	1827	58.1	1858	19.1
9	49.1	49.2	54.6	50.4	54.2	52.4	55.4	49.0	37.9	1860	61.0	1842	23.1
9	54.9	49.0	52.1	55.9	48.8	49.5	57.6	49.5	37.4	1853	61.5	1840	24.1
9	52.9	50.6	60.1	60.5	49.8	51.2	54.4	49.9	40.2	1857	60.7	1840	20.5
0	55.5	50.5	64.0	64.1	51.2	51.0	59.4	49.2	32.4	1861	64.1	1866	31.7
0	50.7	45.6	58.4	58.5	50.8	50.2	57.1	50.1	39.0	1826	61.6	1841	22.6
5	44.6	52.6	44.5	42.9	51.7	55.2	47.9	49.9	39.2	1836	66.0	1828	26.8
6	42.4	49.9	41.4	41.4	52.4	57.2	50.8	51.0	41.4	1836 1865 1866	66.0	1827	24
4	50.3	49.5	52.8	49.5	51.5	49.7	51.4	48.2					

ed to the greatest difference was the 27th; in the year 1861 its Mean Temperature was these numbers is 31°·7.

to the least difference was the 18th; in the year 1859 its Mean Temperature was 38°·4; umbers is 18°·4.

ken on that dk in the years 1826-1869;
every day with

DAY OF THE MONTH	Y.						MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
	1826	1851	1852	1853	1868	1869		Lowest	Year	Highest	Year	
1	43	46.9	46.1	53.6	58.2	43.9	51.0	37.4	1866	63.4	1827	26.0
2	49	46.3	42.4	54.8	57.4	48.9	52.2	40.9	1856	61.3	1839	20.4
3	43	42.6	44.1	51.8	62.3	51.7	52.2	42.6	1831 1866	62.3	1868	19.7
4	43	41.0	45.8	49.2	53.3	42.2	51.8	40.1	1855	68.0	1834	27.9
5	45	45.3	47.7	51.1	48.9	48.9	52.5	43.9	1856	65.1	1862	21.2
6	42	44.9	48.3	44.6	47.2	55.2	52.9	40.1	1831	66.4	1830	26.3
7	44	49.1	54.8	37.9	51.0	55.8	52.4	37.9	1853	64.8	1867	26.9
8	48	52.1	59.2	41.4	55.8	50.8	52.2	38.4	1861	67.0	1867	28.6
9	51	53.8	58.6	43.5	58.1	52.9	52.3	41.0	1837	65.0	1833	24.0
10	51	56.9	54.7	44.6	58.0	57.3	52.4	41.5	1837	64.6	1867	23.1
11	51	54.2	52.1	45.3	57.3	52.8	52.8	44.2	1849	63.5	1848	19.3
12	50	54.3	53.5	49.3	58.4	51.3	53.0	40.8	1855	66.1	1833	25.3
13	47	50.3	56.0	47.8	56.9	51.6	52.7	40.8	1866	62.1	1848	21.3
14	48	47.5	54.2	51.2	59.2	51.2	53.1	40.4	1839	65.4	1848	25.0
15	50	48.6	54.4	53.9	62.0	53.1	54.1	41.2	1839	71.0	1833	29.8
16	51	53.3	60.8	58.6	61.0	50.3	55.4	44.0	1839	67.8	1833	23.8
17	60	54.0	56.5	56.0	58.1	52.8	54.9	46.8	1832 1845	70.3	1833	23.5
18	61	52.4	59.1	56.0	61.6	55.2	55.1	43.8	1844	65.2	1864	21.4
19	61	50.5	59.5	58.3	71.9	48.0	55.8	43.5	1837	71.9	1868	28.4
20	51	52.8	57.8	52.8	59.5	48.6	56.0	44.6	1837	64.6	1864	20.0
21	51	55.9	53.9	51.9	58.1	51.1	56.3	42.6	1837	69.1	1865	26.5
22	61	60.6	54.5	54.1	58.4	51.1	55.3	41.1	1867	63.3	1847	22.2
23	61	54.4	51.8	56.0	55.8	54.5	56.3	39.8	1867	70.9	1847	31.1
24	51	58.4	56.2	60.7	54.8	57.9	56.6	44.2	1867	64.5	1841	20.3
25	51	59.4	55.3	61.0	58.4	60.1	56.3	46.0	1839	65.9	1833	19.9
26	51	52.8	50.6	62.7	58.6	58.3	56.3	45.8	1845	70.6	1855	24.8
27	51	52.8	50.7	63.1	59.5	52.5	57.2	48.3	1844	71.0	1841	22.7
28	51	58.9	52.0	55.0	63.4	43.3	56.8	43.3	1869	74.4	1847	31.1
29	51	58.7	46.9	53.2	65.7	44.4	56.5	44.4	1869	65.7	1868	21.3
30	51	62.3	48.5	56.2	65.1	51.4	57.3	43.4	1855	65.1	1849 1868	21.7
31	51	56.7	48.3	52.0	59.6	48.5	57.6	44.7	1855	69.1	1858	24.4
Means	51	52.5	52.7	52.4	58.5	51.5	54.4					

The M
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The day of the 23rd; in the year 1867 its Mean Temperature was 39° 8; and
The day of the 11th in the year 1849 its Mean Temperature was 44° 2; and in the 1

* Also, Difference between these numbers is 31° 1.

							MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
63	1864	1865	1866	1867	1868	1869		Lowest	Year	Highest	Year	
1	50.1	58.8	59.0	62.4	62.7	58.7	58.2	47.2	1855	69.5	1858	22.3
1.6	55.5	56.2	61.7	68.3	64.5	59.8	58.9	49.2	1855	71.0	1858	21.8
1.7	51.6	59.3	64.7	57.8	61.5	59.3	59.2	50.2	1837	70.0	1858	19.8
1.6	53.8	59.9	60.7	57.9	56.7	58.5	58.4	50.9	1854	69.8	1849	18.9
1.6	60.1	64.0	57.9	57.2	57.8	60.9	59.1	52.2	1860	70.8	1849	18.6
1.6	58.7	69.1	58.3	58.9	64.2	66.5	59.6	49.3	1829	72.2	1846	22.9
1.1	63.4	60.2	63.1	59.5	60.1	71.3	59.0	49.3	1860	73.9	1846	24.6
1.5	64.4	62.4	65.5	58.6	57.2	59.7	59.2	50.5	{ 1838 1847	69.1	1835	18.6
1.0	54.2	65.8	65.2	59.1	60.4	58.4	59.8	48.3	1841	69.1	{ 1835 1858	20.8
1.2	59.4	63.8	69.7	65.2	57.4	54.4	60.0	50.3	1862	70.5	1835	20.2
3.3	53.7	54.2	61.8	68.2	63.0	54.2	60.0	50.7	1841	70.9	{ 1835 1842	20.2
5.2	58.7	58.0	58.3	70.4	62.9	56.9	60.1	48.3	1841	70.5	1842	22.2
5.0	55.2	61.7	56.5	60.2	66.0	59.9	60.7	50.0	1841	70.8	1842	20.8
3.7	59.0	61.3	60.3	57.5	65.7	50.8	60.6	50.8	1869	73.1	1858	22.3
1.7	57.8	61.2	58.5	54.3	65.3	52.8	61.0	45.8	1850	75.9	1858	30.1
1.5	60.4	59.6	59.1	53.4	65.1	49.4	60.7	49.4	1869	77.4	1858	28.0
1.2	61.7	55.7	52.1	55.1	68.1	49.6	60.4	49.1	1855	71.0	1846	21.9
1.2	60.7	53.1	54.8	63.0	64.2	51.5	60.2	51.2	1862	71.4	1846	20.2
1.2	60.4	54.3	57.1	61.6	64.2	52.0	60.1	50.0	1855	71.4	1846	21.4
1.6	62.7	59.9	61.6	56.1	69.7	51.2	61.3	46.8	1855	74.1	1846	27.3
1.1	59.8	62.2	67.8	56.6	69.1	51.4	62.2	51.4	1869	75.3	1834	23.9
2.3	60.9	62.1	61.3	57.9	61.5	55.8	61.4	52.0	1830	74.7	1846	22.7
5.2	55.6	69.2	64.8	60.1	60.7	54.7	61.9	54.7	1869	76.1	1844	21.4
4.7	57.8	60.7	61.2	58.8	63.6	57.8	61.5	53.1	1835	72.8	1844	19.7
1.0	63.0	61.7	64.3	60.3	66.1	58.2	61.5	48.0	1835	71.6	1854	23.6
1.8	58.1	53.7	65.2	57.6	64.3	60.3	62.0	50.0	1835	72.2	1826	22.2
8.7	54.7	63.8	70.8	63.2	70.1	62.6	62.4	51.3	1835	75.5	1826	24.2
7.7	61.0	62.2	71.3	56.3	68.1	56.5	62.3	53.6	1843	73.8	1857	20.2
0.8	64.4	59.0	66.5	62.4	63.5	56.0	61.4	51.4	1839	69.3	1826	17.9
9.5	54.2	56.2	68.5	65.2	64.5	59.0	61.2	50.1	1839	71.2	1826	21.1
9.9	58.4	60.1	62.3	60.1	63.6	56.6	60.5					

a greatest difference was the 15th; in the year 1850 its Mean Temperature was numbers is 30°.1.
 the least difference was the 29th; in the year 1839 its Mean Temperature was numbers is 17°.9.

taken on that day in the years 1826-1869;
for every day with

Y.							MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
	1851	1852	1853	1854	1868	1869		Lowest	Year	Highest	Year	
1	68.3	61.2	57.2	55.9	59.8	58.3	61.3	52.4	1833	73.9	1836	21.5
2	67.4	60.8	58.1	61.7	55.5	59.0	62.0	54.6	1862	69.6	1836	15.0
3	59.0	64.5	60.5	63.8	55.8	58.6	62.6	54.4	1862	73.5	1828	19.1
4	57.1	74.2	62.9	58.1	50.8	64.5	63.5	55.3	1829	74.8	1826	19.5
5	60.4	79.2	65.0	57.1	59.4	65.9	64.0	54.1	1864	79.2	1852	25.1
6	62.6	77.3	67.0	55.4	57.1	65.3	63.9	55.4	1854	77.3	1852	21.9
7	64.1	72.5	71.5	57.9	55.6	63.6	62.9	54.9	1850	72.5	1852	17.6
8	61.1	69.8	68.7	58.2	70.6	67.7	62.5	46.3	1856	71.9	1828	25.6
9	60.2	72.2	67.1	60.1	70.6	62.0	62.5	52.5	1856	72.2	1852	19.7
10	56.4	69.5	58.3	59.7	57.8	64.4	62.7	55.4	1858	72.5	1836	17.1
11	61.0	69.9	60.4	57.8	58.8	65.6	63.5	54.4	1862	73.9	1836	19.5
12	66.4	67.6	63.7	53.2	57.6	73.4	63.9	53.2	1854	74.3	1859	21.1
13	62.2	69.9	63.3	59.5	57.3	60.3	64.0	52.9	1840	75.0	1847	22.1
14	61.5	69.6	55.2	59.7	70.5	64.6	64.3	55.2	1853	76.1	1847	20.9
15	60.2	72.8	56.5	60.3	70.9	66.0	64.3	56.3	1845	73.9	1858	17.6
16	57.1	71.2	57.6	65.0	73.1	72.1	63.7	57.1	1851	73.1	1868	16.0
17	60.4	66.8	58.6	61.8	71.7	75.0	64.4	58.0	1863	77.0	1834	19.0
18	58.3	64.4	58.7	62.4	73.6	73.8	63.2	56.8	1863	75.1	1859	18.3
19	60.0	67.6	59.8	61.5	71.6	64.5	62.4	54.9	1832	71.6	1868	16.7
20	62.6	64.3	61.3	65.4	74.9	58.6	62.3	50.2	1836	74.9	1868	24.7
21	62.2	64.7	62.3	65.1	77.9	65.7	62.5	54.9	1863	77.9	1868	23.0
22	65.5	66.0	60.2	68.8	75.7	75.6	63.2	53.8	1838	75.7	1868	21.9
23	62.5	65.3	62.6	72.6	59.0	67.8	63.4	52.2	1843	73.3	1844	21.1
24	56.7	68.3	59.8	72.6	57.2	66.6	62.8	54.3	1843	72.6	1854	18.3
25	60.4	65.8	62.0	74.5	58.7	67.6	62.6	50.1	1860	74.7	1844	24.6
26	59.9	67.0	60.7	67.1	59.1	65.3	62.6	53.3	1867	75.0	1830	21.7
27	63.6	66.2	64.9	60.1	73.0	64.0	63.3	52.8	1867	73.9	1830	21.1
28	63.1	67.5	62.5	59.4	72.7	56.0	63.7	53.7	1867	72.7	1868	19.0
29	62.5	65.6	62.5	60.5	71.1	63.1	63.2	54.6	1845	75.3	1827	20.7
30	64.4	62.6	58.3	64.2	77.4	68.3	62.9	55.3	1828	77.9	1830	22.6
31	65.3	67.6	63.0	66.5	76.0	66.5	62.9	53.7	1841	76.4	1846	22.7
Mean	61.7	68.1	61.6	62.1	68.7	65.5	63.1					

The day of the month 8th; in the year 1856 its Mean Temperature was 46°3; and in the
The day of the month in the years 1833 and 1862 its Mean Temperature was 54°6; and in

Society at Chiswick in the years 1826-1869;

						MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
1864	1865	1866	1867	1868	1869		Lowest	Year	Highest	Year	
63.9	53.9	61.3	58.5	70.4	63.9	63.8	53.9	1865	74.8	1846	20.9
59.0	52.4	63.7	51.5	73.6	59.0	63.6	51.5	1867	73.8	1856	22.3
62.9	51.5	60.6	58.7	72.4	59.1	63.5	51.5	1865	73.2	1856	21.7
66.7	53.8	59.5	58.7	74.1	66.0	63.8	53.0	1854	74.1	1868	21.1
72.4	58.3	56.7	62.2	73.8	62.4	63.3	54.4	1854	73.8	1868	19.4
68.3	62.3	57.5	58.4	70.7	58.1	62.5	56.0	1833	72.9	1846	16.9
63.7	64.0	58.7	59.7	68.4	58.8	63.1	54.7	1860	70.3	1849	15.6
67.2	60.2	55.7	63.2	64.7	61.3	62.8	54.6	1862	70.2	1849	15.6
61.1	59.3	57.3	61.3	69.8	63.2	63.0	55.6	1848	70.8	1831	15.2
54.2	65.9	57.3	60.0	68.8	57.5	63.2	54.2	1864	77.3	1842	23.1
55.3	62.0	61.3	64.3	68.3	55.7	63.7	55.3	1864	73.0	1835	17.7
60.1	60.6	60.8	67.8	62.6	57.8	63.5	53.7	1841	74.6	1861	20.9
62.3	62.5	62.1	68.3	64.2	59.2	63.0	56.3	1830	70.9	1851	14.6
62.8	59.3	60.0	76.2	63.9	58.1	62.3	53.5	1828	76.2	1867	22.7
64.0	60.4	59.9	67.0	66.4	63.3	62.3	51.5	1829	72.7	1842	21.2
62.3	60.0	55.6	62.8	65.4	63.1	62.2	54.1	1845	72.9	1842	18.8
60.7	61.1	54.1	63.0	64.1	57.5	61.7	51.7	1854	71.4	1837	19.7
55.5	61.0	57.5	61.3	64.3	60.4	62.2	53.2	1830	76.7	1842	23.5
57.9	57.3	62.8	69.1	64.0	56.8	62.4	53.0	1839	73.3	1843	20.3
58.3	61.8	63.3	64.3	60.5	58.6	62.2	54.3	1839	71.8	1826	17.5
54.2	60.8	60.3	65.8	61.1	59.4	61.3	50.4	1850	71.8	1835	21.4
56.5	63.2	62.4	58.9	59.6	64.8	61.3	53.9	1850	70.7	1842	16.8
49.5	59.5	64.3	60.4	59.1	64.2	60.8	49.5	1864	73.0	1857	23.5
52.0	63.3	63.0	62.9	59.4	64.9	60.5	52.0	1864	70.1	1857	18.1
50.4	60.8	62.1	64.4	56.3	69.3	61.0	50.4	1864	71.3	1859	20.9
52.5	60.1	66.9	56.9	57.7	69.9	61.1	52.5	1864	69.9	1869	17.4
52.4	61.8	65.7	57.1	62.0	71.0	61.7	52.4	1864	71.0	1869	18.6
61.4	61.7	60.9	58.9	57.8	71.0	61.5	53.7	1844	71.0	1869	17.3
62.8	52.4	54.8	65.1	58.7	57.1	60.1	51.9	1850	67.8	1826	15.9
65.8	56.7	59.0	62.1	64.0	55.0	60.4	51.7	1850	70.0	1826	18.3
61.7	65.3	60.4	68.7	64.0	54.4	60.1	49.3	1833	68.7	1867	19.4
59.9	59.8	60.3	62.5	64.8	61.3	62.2					

the greatest difference was the 18th; in the year 1830 its Mean Temperature was 56° 3; its difference was the 13th; in the year 1830 its Mean Temperature was 56° 3; 14° 6.

taken on that day at the G_n the years 1826-1869;
every day within the same

	51	1852	1853	1854	1855	1856	1869	MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
									Lowest	Year	Highest	Year	
1	3-1	59-8	58-1	57-8	56-8	58-6	58-5	59-6	61-1	1833	70-7	1843	19-6
2	3-4	61-6	52-9	58-3	56-8	54-6	52-8	59-6	61-9	1833	69-8	1842	17-9
3	5-6	63-4	55-1	60-3	59-8	55-4	54-0	59-8	52-4	1847	69-9	1843	17-5
4	1-6	64-0	57-9	58-4	58-3	56-4	61-7	59-7	47-7	1841	68-9	1834	21-2
5	9-6	63-0	58-9	57-5	53-7	55-2	67-0	59-5	48-5	1841	68-6	1848	20-1
6	7-3	61-0	57-5	57-4	50-4	58-3	63-6	59-5	49-3	1841	70-7	1868	21-4
7	3-3	62-3	55-5	62-3	52-5	59-0	66-2	60-0	61-9	1850	71-5	1868	19-6
8	4-9	64-4	55-4	55-3	54-3	57-8	67-6	59-9	50-3	1850	71-7	1865	21-4
9	1-9	63-4	55-8	55-7	55-4	58-6	65-8	59-6	50-9	1838	66-8	1843	15-9
10	1-1	63-9	56-8	55-0	54-7	61-6	59-9	58-5	47-4	1800	69-2	1865	21-8
11	1-9	57-9	57-1	54-8	56-3	60-9	60-4	57-4	47-6	1860	69-5	1865	21-9
12	1-7	56-4	62-8	62-3	56-7	58-4	55-1	57-5	47-2	1848	69-3	1841	22-1
13	1-2	57-6	53-7	65-0	59-3	55-2	57-4	57-8	50-5	1848	68-7	1841	18-2
14	1-7	54-5	55-2	61-2	50-8	52-4	61-8	56-8	49-6	1840	67-6	1841	13-0
15	1-2	55-8	57-3	61-7	53-5	58-3	58-3	57-2	48-8	1840 1848	67-7	1865	18-9
16	1-3	51-9	60-6	66-3	61-0	57-1	61-0	58-7	49-7	1829	68-0	1843	18-3
17	1-0	48-7	60-5	62-5	58-1	59-0	61-2	58-1	48-7	1852	67-4	1843	18-7
18	1-3	57-6	57-5	59-9	60-9	52-0	61-9	56-7	47-0	1847	67-1	1843	20-1
19	1-4	57-4	58-1	64-3	59-8	49-1	54-9	56-7	47-9	1832	66-9	1837	19-0
20	1-2	55-6	52-9	58-1	59-0	48-8	52-0	56-2	47-7	1840	66-1	1834	18-4
21	1-2	50-1	54-3	54-3	59-0	53-8	52-6	55-9	44-8	1836	64-4	1834	19-6
22	1-4	51-2	60-4	51-2	58-8	55-0	57-3	56-4	46-9	1840	64-0	1835	17-1
23	1-0	56-6	55-1	58-3	64-8	55-4	61-2	56-5	44-9	1845	64-8	1855	19-9
24	1-2	55-3	48-5	57-2	54-3	54-6	65-5	56-0	48-3	1860	65-5	1869	17-2
25	1-5	55-5	55-2	52-2	50-8	52-0	62-8	55-7	43-6	1860	62-9	1828	19-3
26	1-1	54-2	49-1	51-6	47-6	53-8	58-1	55-6	47-6	1855	66-7	1828	19-1
27	1-7	54-7	54-7	53-7	59-3	51-3	56-7	55-8	45-3	1847	62-6	1827	17-3
28	1-2	55-6	60-1	54-4	62-2	52-2	58-1	55-5	47-4	1847	64-8	1831	17-4
29	1-2	53-3	56-2	55-1	62-8	53-8	65-4	55-8	46-0	1829	65-4	1869	19-4
30	1-4	51-1	51-0	54-9	58-7	53-4	60-4	55-2	44-8	1836	64-9	1831	20-1
Means	7	57-3	56-1	57-9	56-9	55-2	59-8	57-6					

The day of the month whose Mean Temperature was 47°-2; and in the year 1841 it was 66°-2;
The day of the month whose Mean Temperature was 50°-9; and in the year 1843 it was 66°-2

							MEANS OF 44 YEARS.	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY.
	1864	1865	1866	1867	1868	1869		Lowest	Year	Highest	Year	
3	54.4	59.8	56.2	48.7	53.6	58.5	54.4	47.7	1845	64.2	1831	16.5
3	51.4	61.8	59.4	50.3	50.9	56.7	54.8	44.0	1853	63.9	1837	19.9
9	48.3	57.9	62.0	45.0	47.8	56.1	54.4	41.3	1853	62.4	1862	21.1
3	48.1	54.3	58.2	42.1	50.6	53.9	53.7	42.1	1867	63.5	1859	21.4
4	48.2	51.7	55.1	40.2	53.9	49.9	52.4	40.2	1867	62.0	1859	21.8
7	44.4	51.9	56.2	43.4	53.4	54.8	52.1	40.1	1840	62.5	1831	22.4
5	50.7	54.9	56.7	45.6	49.5	57.7	53.3	38.8	1829	63.3	1831	24.5
7	51.4	55.4	54.4	43.1	50.3	61.2	52.1	40.1	1829	62.3	1861	22.2
3	50.8	58.4	50.9	42.7	50.2	60.3	51.4	37.9	1852	61.0	1839	23.1
8	50.8	58.4	53.3	42.2	51.5	61.7	52.7	41.1	1849	62.5	1851	21.4
1	51.5	56.8	51.9	44.6	48.9	59.6	52.9	42.3	1850	63.2	1832	20.9
6	52.5	51.0	49.3	43.8	52.6	60.2	51.6	39.1	1860	62.2	1826	23.1
3	51.5	48.0	47.5	45.8	50.6	57.8	51.4	35.7	1838	63.3	1831	27.6
8	50.2	49.8	49.2	51.8	48.1	49.3	51.3	37.6	1838	60.0	1861	22.4
9	47.2	48.2	46.1	56.5	51.4	54.0	50.8	37.7	1843	58.0	1862	20.3
0	50.5	48.8	39.4	55.5	49.5	49.5	50.0	36.3	1843	56.7	1838	20.4
5	54.1	50.6	48.8	53.8	44.7	41.7	49.8	41.7	1869	56.7	1831	15.0
5	52.2	49.1	50.2	51.9	41.6	40.9	49.6	37.6	1843	59.8	1831	22.2
0	56.2	42.8	56.9	46.2	38.6	38.3	50.0	36.2	1843	59.2	1851	23.0
0	53.0	41.2	55.6	46.1	39.4	42.4	49.4	35.9	1842	60.0	1851	24.1
6	52.9	42.7	55.8	51.1	42.4	47.4	49.4	34.1	1842	61.1	1826	27.0
2	52.6	47.6	49.2	59.6	42.2	45.2	50.4	36.2	1859	61.0	1830	24.8
4	51.7	49.6	48.6	54.7	45.0	49.5	50.2	31.6	1859	57.0	1849	25.4
3	44.2	52.6	50.6	52.9	47.9	46.6	48.5	29.9	1859	56.7	{ 1833 1861	26.8
5	50.6	45.6	45.0	50.1	50.0	44.5	47.8	38.8	1859	57.2	1833	18.4
1	53.4	48.4	45.5	52.3	46.0	39.2	46.5	38.4	1850	57.5	1833	19.1
1	54.2	45.2	44.3	46.0	41.2	34.6	46.7	33.7	1859	58.3	1853	24.6
	51.2	40.0	46.7	42.3	42.7	36.8	46.3	34.0	1836	55.3	1831	21.3
	52.4	47.1	42.7	54.0	47.7	41.4	45.5	32.5	1836	56.4	1833	23.9
	45.1	47.2	51.0	52.9	47.9	43.2	46.5	32.5	1836	53.8	1843	21.3
	42.9	44.7	44.4	54.0	51.8	44.1	46.7	32.5	1836	56.2	1847	23.7
	50.6	50.4	51.0	48.7	47.8	49.6	50.4					

greatest difference was the 13th; in the year 1838 its Mean Temperature was 27°6.

st difference was the 17th; in the year 1869 its Mean Temperature was 41°7, 15°0.

*Is taken on that thiswick in the years 1826-1869;
perature for every*

DAY OF THE MONTH	NOVEMBER.						MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
	1850	1851	1852	1853	1868	1869		Lowest	Year	Highest	Year	
1	5.0	41.8	58.7	51.9	51.7	47.7	46.5	35.0	1858	58.7	1852	23.7
2	1.6	39.1	55.2	52.9	48.4	51.7	46.3	36.6	1858	55.8	1857	19.2
3	9.9	35.4	50.1	47.9	50.5	48.8	45.2	34.7	1861	56.3	1857	21.6
4	8.9	36.5	51.1	48.0	49.2	47.7	44.9	31.5	1848	56.4	1863	24.9
5	0.1	37.5	55.5	47.5	38.7	47.0	45.6	37.5	1851	58.5	1834	21.0
6	7.8	42.4	51.3	51.7	33.3	42.0	45.0	33.3	1868	57.6	1834	24.3
7	1.2	41.3	57.1	52.1	34.3	42.3	44.6	33.4	1864	57.1	1852	23.7
8	3.7	42.7	59.5	47.9	33.7	46.9	43.6	28.6	1837	59.5	1852	30.9
9	7.4	41.7	55.2	37.8	39.0	44.0	42.5	34.9	1854	55.2	1852	20.3
10	3.0	43.3	48.4	37.9	40.3	34.2	42.8	31.9	1864	53.0	1850	21.1
11	2.9	42.0	49.6	39.2	42.1	34.4	42.8	31.1	1828	52.9	1850	21.8
12	3.5	38.4	47.0	43.8	41.7	38.7	42.2	29.0	1828	55.0	1829	26.0
13	7.7	40.9	46.0	42.6	40.9	48.9	42.6	30.7	1859	53.5	1827	22.8
14	3.7	40.0	49.9	39.0	41.6	53.7	42.1	24.1	1859	53.7	1869	29.6
15	6.1	33.8	53.1	37.9	40.6	50.5	42.2	30.8	1851	54.3	1844	23.5
16	2.9	35.1	55.0	36.1	39.6	51.8	42.2	29.7	1841	57.4	1840	27.7
17	3.1	30.9	50.4	32.1	42.4	36.4	41.3	28.5	1841	52.8	1839	24.3
18	7.8	33.2	43.6	30.6	42.8	38.9	41.5	23.8	1861	52.0	1844	28.2
19	0.1	30.9	43.8	35.2	41.7	45.4	41.4	27.0	1858	52.6	1845	25.6
20	7.2	34.8	47.4	39.7	34.7	36.5	41.7	29.1	1829	51.7	1865	22.6
21	2.0	39.8	51.1	33.3	39.8	38.4	42.8	27.1	1858	54.5	1831	27.4
22	0.4	39.8	44.3	29.2	45.4	43.5	42.5	25.8	1858	54.2	1831	28.4
23	7.8	38.0	39.7	29.1	43.8	39.9	41.8	20.3	1858	53.5	1831	33.2
24	0.2	38.7	41.2	34.8	39.3	39.7	40.7	27.0	1858	52.3	1846	25.3
25	1.2	33.1	40.8	38.6	42.5	40.4	40.2	31.7	1829	52.1	1831	20.4
26	9.9	32.9	52.7	40.0	42.7	44.3	41.1	30.6	1849	54.0	1835	23.4
27	7.3	35.2	43.7	37.5	40.8	43.9	40.2	28.0	1849	52.5	1836	24.5
28	1.6	36.7	40.6	40.7	43.7	41.8	41.4	27.0	1849	54.7	1828	27.7
29	2.0	30.5	37.1	43.6	43.1	37.3	41.2	26.8	1856	53.6	1841	26.8
30	1.4	30.0	35.6	49.6	41.5	33.0	41.5	26.3	1856	53.6	1847	27.3
Means	4.7	37.1	48.5	40.9	39.1	43.0	42.7					

The
The
The
in

The day of the Month in the year 1858 its Mean Temperature was
20.3; and in the
The day of the Month in the year 1858 its Mean Temperature was
36.6; and in the

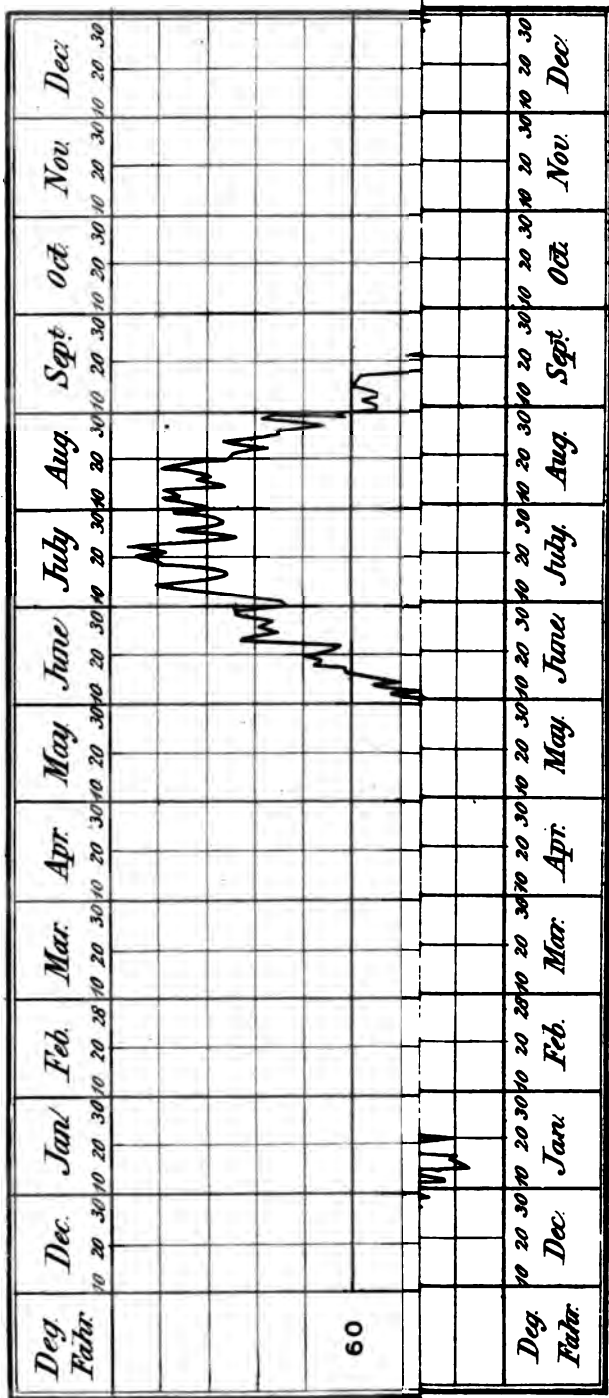
ral Society at Chiswick in the years 1826-1869;

						MEANS OF 44 YEARS	LOWEST AND HIGHEST MEAN DAILY TEMPERATURE IN 44 YEARS				DIFFERENCE BETWEEN THE COLDEST AND HOTTEST DAY
1864	1865	1866	1867	1868	1869		Lowest	Year	Highest	Year	
36.4	43.2	34.1	48.1	43.0	30.0	41.5	26.0	1856	51.1	1833	25.1
35.9	41.7	38.0	28.4	45.0	31.1	40.8	27.2	1856	50.6	1857	23.4
47.1	42.7	47.4	33.4	46.9	30.7	41.4	29.5	1846	51.8	1836	22.3
48.3	43.4	52.9	31.2	53.6	32.1	42.3	30.2	1837	54.0	1836	23.8
48.5	45.7	52.5	37.0	53.0	34.7	42.9	25.5	1844	53.4	1852	27.9
46.5	49.4	52.0	34.1	52.9	37.2	42.4	21.9	1844	52.9	1862	31.0
47.5	49.0	49.7	32.7	49.6	37.4	42.8	27.9	1844	56.7	1856	28.8
42.1	47.0	40.1	31.3	49.3	40.1	41.5	29.2	1855	55.3	1856	26.1
41.7	44.9	43.4	23.1	44.2	40.3	40.9	23.1	1867	54.2	1856	31.1
47.7	42.0	43.6	32.3	49.0	41.5	41.2	27.7	1835	52.4	1847	24.7
47.3	39.1	35.7	43.2	48.9	44.1	40.2	25.7	1835	52.7	1852	27.0
43.0	40.0	50.1	46.0	37.4	40.1	40.6	26.8	1855	53.5	1842	26.7
41.5	37.8	49.4	42.0	46.6	47.2	40.7	23.5	1846	52.5	1842	29.0
43.1	39.4	44.3	47.7	50.9	42.6	40.8	23.0	1846	50.9	1868	27.9
44.3	37.6	43.2	51.1	51.0	41.5	41.1	23.0	1840	51.8	1833	28.8
43.2	39.3	45.4	50.8	47.7	44.9	40.7	22.4	1859	51.9	1849	28.5
43.5	41.5	42.9	48.7	46.9	42.5	40.3	21.3	1859	51.8	1857	30.5
27.5	39.9	48.3	35.9	50.0	50.9	39.9	20.2	1859	53.6	1827	33.4
33.8	42.5	41.6	33.9	39.9	45.5	39.5	20.3	1859	51.2	1827	30.9
41.7	46.5	32.2	29.4	42.2	41.0	39.0	24.5	1855	52.3	1828	27.8
40.3	47.7	35.2	40.7	49.4	37.1	39.3	19.8	1855	52.6	1828	32.8
33.4	40.9	38.3	40.8	47.5	37.8	39.4	20.7	1855	52.5	1828	31.8
30.4	40.6	41.8	33.5	41.3	40.6	38.5	22.9	1860	52.0	1843	29.1
32.2	33.5	41.2	39.0	44.5	35.4	38.5	18.9	1830	51.9	1852	33.0
32.4	39.9	38.4	35.4	40.6	31.9	36.8	18.7	1860	49.0	1827	30.3
33.9	45.2	44.9	30.8	45.2	26.1	37.5	22.5	1835	50.7	1852	28.2
32.2	37.7	44.4	32.9	48.5	27.0	37.0	25.4	1829	49.0	1852	23.6
39.0	44.3	47.7	31.5	42.6	23.5	36.5	21.4	1860	49.9	1862	28.5
39.9	47.2	48.4	35.1	36.9	32.8	38.2	22.5	1853	50.8	1833	28.3
36.8	42.6	37.9	32.7	37.0	38.5	39.1	29.5	1836	51.6	1834 1842	22.1
33.8	46.4	28.5	27.2	37.2	41.6	38.6	24.2	1846	52.0	1859	27.8
38.1	42.5	43.0	36.8	45.8	37.7	40.0					

the greatest difference was the 18th; in the year 1859 its Mean Temperature was 29.5; the least difference was the 30th; in the year 1836 its Mean Temperature was 22.1.*



DIAGRAM showing the Mean Temperature of the Air for every day in the year, from observations made, from January 1, 1826, to December 31, 1869, at the Gardens of the Royal Horticultural Society at Chiswick.



By examining the numbers in the forty-sixth column, it will be seen that there are many large differences between the values on consecutive days.

By laying these down on a diagram all these are shown, and by making a curved line to pass through or near all these points, giving equal weight to every one, the most probable temperature of every day in the year is shown. The numbers in Table XIII. are the best I can decide upon as the nearest approximation to the true temperature belonging to every day in the year.

The days of the lowest mean temperature ($36^{\circ}3$) are January 7th, 8th, and 9th; it then *increases* to $39^{\circ}3$ on the 4th of February, remains *stationary* at that temperature till the 8th, and then gradually *decreases* to $39^{\circ}0$ on the 13th and three following days; from the 16th it *increases*, and continues so to do, gradually for the first few days, but towards the end of March at a more rapid rate, the mean temperatures of consecutive days differing as much as two or three-tenths of a degree from each other, and continues increasing at this rate till the 8th of June, when it slackens to a general rate of one-tenth, but still increases till we arrive at July 9th, the mean temperature of this day differing from that of the 26th of the same month by one-tenth of a degree only; it then begins to *decrease*, gradually till the 11th of August, and at a more rapid rate from that date, decreasing uninterruptedly till the 21st of November, from which day till the 9th of December, when the change is very small, the mean temperature being unchanged for three and four days together, it then continues to decrease until the end of the year.

TABLE XIII.

Showing the adopted Mean Temperature of every day in the year as determined from all the Thermometrical Observations taken at the Gardens of the Royal Horticultural Society, Chiswick.

DAYS OF THE MONTH	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
p	36.8	39.1	40.6	45.5	51.0	58.4	62.7	63.2	60.0	54.7	45.7	41.3
1	36.7	39.2	40.7	45.7	51.3	58.6	62.8	63.2	59.8	54.5	45.5	41.3
2	36.6	39.2	40.8	45.9	51.5	58.8	62.9	63.2	59.6	54.2	45.4	41.3
3	36.5	39.3	41.0	46.2	51.7	59.2	63.0	63.2	59.5	54.0	45.1	41.3
4	36.4	39.3	41.1	46.5	52.0	59.4	63.1	63.1	59.4	53.7	44.8	41.2
5	36.4	39.3	41.3	46.7	52.2	59.6	63.1	63.1	59.3	53.4	44.5	41.2
6	36.3	39.3	41.5	46.9	52.5	59.7	63.2	63.0	59.1	53.0	44.1	41.1
7	36.3	39.3	41.6	47.1	52.8	59.9	63.2	62.9	59.0	52.6	43.8	41.0
8	36.3	39.2	41.7	47.2	53.0	60.0	63.2	62.9	58.9	52.5	43.5	41.0
9	36.4	39.2	41.8	47.3	53.2	60.1	63.3	62.8	58.7	52.3	43.3	40.9
10	36.4	39.1	42.0	47.5	53.4	60.2	63.3	62.8	58.5	52.1	43.1	40.8
11	36.5	39.1	42.1	47.6	53.6	60.4	63.3	62.7	58.3	51.7	42.8	40.7
12	36.6	39.0	42.2	47.7	53.8	60.5	63.3	62.6	58.1	51.4	42.5	40.7
13	36.6	39.0	42.3	47.9	54.0	60.6	63.3	62.5	58.0	51.3	42.4	40.6
14	36.6	39.0	42.3	47.9	54.0	60.6	63.3	62.5	58.0	51.3	42.4	40.6

15	36.7	39.0	42.4	48.1	54.3	60.7	63.4	62.4	57.8	51.0	42.2	40.5
16	36.7	39.0	42.6	48.3	54.6	60.9	63.4	62.8	57.6	50.7	42.1	40.4
17	36.8	39.1	42.7	48.4	54.8	61.1	63.4	62.1	57.8	50.5	42.0	40.2
18	36.9	39.1	42.8	48.6	55.1	61.2	63.4	62.0	57.2	50.1	41.9	40.0
19	37.2	39.2	43.0	48.7	55.4	61.4	63.4	61.8	57.1	49.8	41.8	39.8
20	37.4	39.3	43.2	48.8	55.7	61.6	63.4	61.6	56.9	49.5	41.7	39.7
21	37.5	39.4	43.4	49.0	55.9	61.6	63.4	61.5	56.7	49.2	41.6	39.4
22	37.7	39.6	43.5	49.2	56.1	61.7	63.4	61.4	56.6	48.8	41.6	39.0
23	37.9	39.7	43.7	49.3	56.3	61.8	63.4	61.3	56.3	48.4	41.6	38.9
24	38.3	39.8	43.9	49.5	56.4	62.0	63.4	61.2	56.1	48.0	41.5	38.7
25	38.4	40.0	44.1	49.6	56.6	62.1	63.4	61.0	55.9	47.6	41.5	38.4
26	38.5	40.1	44.2	49.7	56.7	62.2	63.4	60.9	55.7	47.3	41.4	38.1
27	38.6	40.2	44.4	49.8	56.9	62.3	63.3	60.8	55.5	47.0	41.4	37.8
28	38.7	40.4	44.5	50.1	57.2	62.4	63.3	60.7	55.4	46.6	41.4	37.6
29	38.8	...	44.7	50.4	57.5	62.5	63.3	60.5	55.2	46.4	41.4	37.5
30	38.9	...	44.9	50.7	57.9	62.6	63.3	60.4	55.0	46.2	41.3	37.3
31	39.0	...	45.3	...	58.1	...	63.3	60.2	...	45.9	...	37.1
Means	37.2	39.4	42.7	48.1	54.6	60.8	63.3	62.0	57.6	50.5	42.8	39.8

TABLE XIV.—Showing the Mean Temperature of every Month and Year, as deduced from the Observations at the Gardens of the Royal Horticultural Society at Chiswick, 1826–1869.

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1826	32.5	43.9	43.5	50.7	53.0	64.0	66.6	65.9	59.0	53.0	41.3	43.8
1827	36.7	33.9	45.4	50.1	56.3	60.3	66.5	62.8	59.5	52.9	43.9	44.7
1828	41.7	42.2	45.4	49.8	57.3	62.7	63.3	61.3	60.2	51.2	45.4	45.3
1829	33.2	39.9	40.9	46.0	55.8	60.3	61.0	59.8	55.1	48.6	40.6	33.6
1830	32.3	36.9	48.5	51.1	57.0	57.8	64.8	60.3	55.6	51.8	45.4	35.9
1831	35.6	42.9	46.8	51.6	54.6	61.4	64.9	65.5	58.6	56.9	43.4	42.6
1832	36.9	38.2	42.7	49.0	53.2	61.0	62.5	62.7	57.7	51.5	44.3	41.8
1833	34.9	43.8	39.0	47.2	61.0	61.1	62.2	59.9	55.1	51.4	43.6	45.7
1834	45.6	41.2	45.4	47.6	57.8	61.9	65.7	63.6	59.8	51.6	44.7	40.9
1835	38.8	43.0	42.8	49.0	54.1	61.2	65.1	65.2	59.2	49.0	44.6	35.0
1836	38.0	37.9	44.8	45.6	53.1	62.6	64.2	61.5	54.9	48.4	42.5	40.3
1837	38.2	41.1	37.6	42.1	49.5	60.8	64.0	62.8	56.9	50.9	40.5	41.1
1838	28.5	33.7	42.3	44.3	53.3	59.3	62.2	61.8	56.2	51.1	41.7	38.8
1839	37.6	40.3	41.6	44.7	53.2	61.0	62.5	61.7	57.8	50.7	46.2	40.2
1840	39.6	39.1	39.4	50.8	56.6	61.4	60.4	63.8	54.0	46.0	43.2	32.5
1841	34.6	37.1	46.9	48.2	58.9	57.4	59.7	61.8	59.3	50.2	43.1	40.3
1842	33.4	41.2	45.9	47.6	55.0	63.6	60.3	67.2	58.1	46.3	43.3	44.6
1843	40.1	38.5	43.8	49.2	63.1	57.2	62.0	63.5	61.8	48.6	43.3	44.0
1844	38.7	36.1	42.5	52.6	53.7	61.7	63.2	59.4	58.5	49.7	43.4	33.6

1845	38.9	33.0	36.9	48.2	50.2	60.3	61.1	58.6	54.5	49.2	44.5	40.5
1846	43.2	43.5	44.1	47.8	56.7	66.8	65.8	64.1	61.1	50.1	44.7	32.4
1847	34.8	35.8	41.4	45.3	57.3	58.3	65.6	62.6	54.2	52.4	46.2	42.1
1848	34.4	43.8	43.8	48.3	59.0	59.4	62.4	59.0	56.7	50.2	41.6	42.4
1849	39.9	41.9	43.1	44.9	55.7	60.3	62.4	63.3	58.5	50.1	42.9	38.0
1850	33.4	43.6	39.7	49.7	51.9	61.0	62.4	60.3	55.7	45.4	44.7	39.2
1851	42.1	39.8	43.1	46.5	52.5	60.4	61.7	63.6	56.7	52.4	37.1	40.0
1852	40.4	40.0	41.0	46.8	52.7	58.2	68.1	63.1	57.3	47.1	48.5	47.2
1853	42.2	33.1	38.6	47.1	52.5	59.4	61.6	60.6	58.1	50.9	40.9	38.8
1854	38.7	39.1	44.0	49.8	51.8	57.6	62.1	61.2	57.9	49.0	39.6	39.9
1855	34.5	28.8	38.4	47.0	49.9	58.3	63.1	62.9	56.9	50.6	40.9	35.6
1856	38.8	41.8	39.5	47.7	50.6	59.8	62.1	63.8	55.2	51.3	40.0	39.4
1857	35.9	37.8	42.5	46.8	54.9	62.7	64.3	65.2	59.4	52.4	45.8	44.2
1858	36.1	34.9	42.3	48.5	53.1	65.8	61.5	62.1	60.5	50.0	37.7	40.0
1859	39.8	41.9	46.5	47.6	58.8	62.9	68.1	63.1	56.7	50.1	40.3	35.7
1860	39.0	35.3	41.8	43.8	54.3	55.3	58.6	58.2	53.3	50.0	39.7	35.4
1861	32.6	41.6	43.7	44.8	52.6	60.4	61.7	63.2	57.0	54.7	39.1	39.5
1862	38.5	41.5	43.9	49.4	56.8	57.4	59.1	60.1	57.9	52.0	39.9	43.5
1863	41.5	42.3	44.7	50.8	52.9	59.9	62.2	62.7	54.5	52.1	44.8	42.3
1864	34.7	35.8	41.3	49.5	54.9	58.4	61.9	59.9	57.0	50.6	41.6	38.1
1865	36.1	36.7	36.8	52.8	56.7	60.1	63.9	59.8	62.7	50.4	44.1	42.5
1866	42.7	40.6	41.1	49.5	51.1	62.3	61.8	60.3	56.7	51.0	44.7	48.0
1867	33.2	45.0	38.6	51.5	54.7	60.1	60.6	62.5	58.5	48.7	40.4	36.8
1868	37.5	43.5	45.4	49.7	58.5	63.6	68.7	64.8	60.9	47.8	41.3	45.8
1869	40.6	45.2	38.1	51.4	51.5	56.6	65.5	61.3	59.8	49.6	43.0	37.7

From the numbers in this table we learn that the coldest month in the year has taken place in January 26 times, in February 8 times, December 8 times, in March once, and in November once. These unusual circumstances took place in the years 1837 and 1851 respectively.

The hottest month has occurred twice in June, 27 times in July, and 15 times in August.

The month of lowest temperature was January 1838; and of highest was July 1852.

By taking the mean of all the values for each month, we find :—

The mean temperature of January	was	37·4
" " February	"	39·4
" " March	"	42·4
" " April	"	48·2
" " May	"	54·4
" " June	"	60·5
" " July	"	63·1
" " August	"	62·2
" " September	"	57·6
" " October	"	50·4
" " November	"	42·7
" " December	"	40·0

And the mean of these gives 49°·9 as the mean yearly temperature.

By taking the means of the numbers in each horizontal line, the mean temperature for each year is determined as follows :—

TABLE XV.—*Mean Temperature of every Year, 1826–1869.*

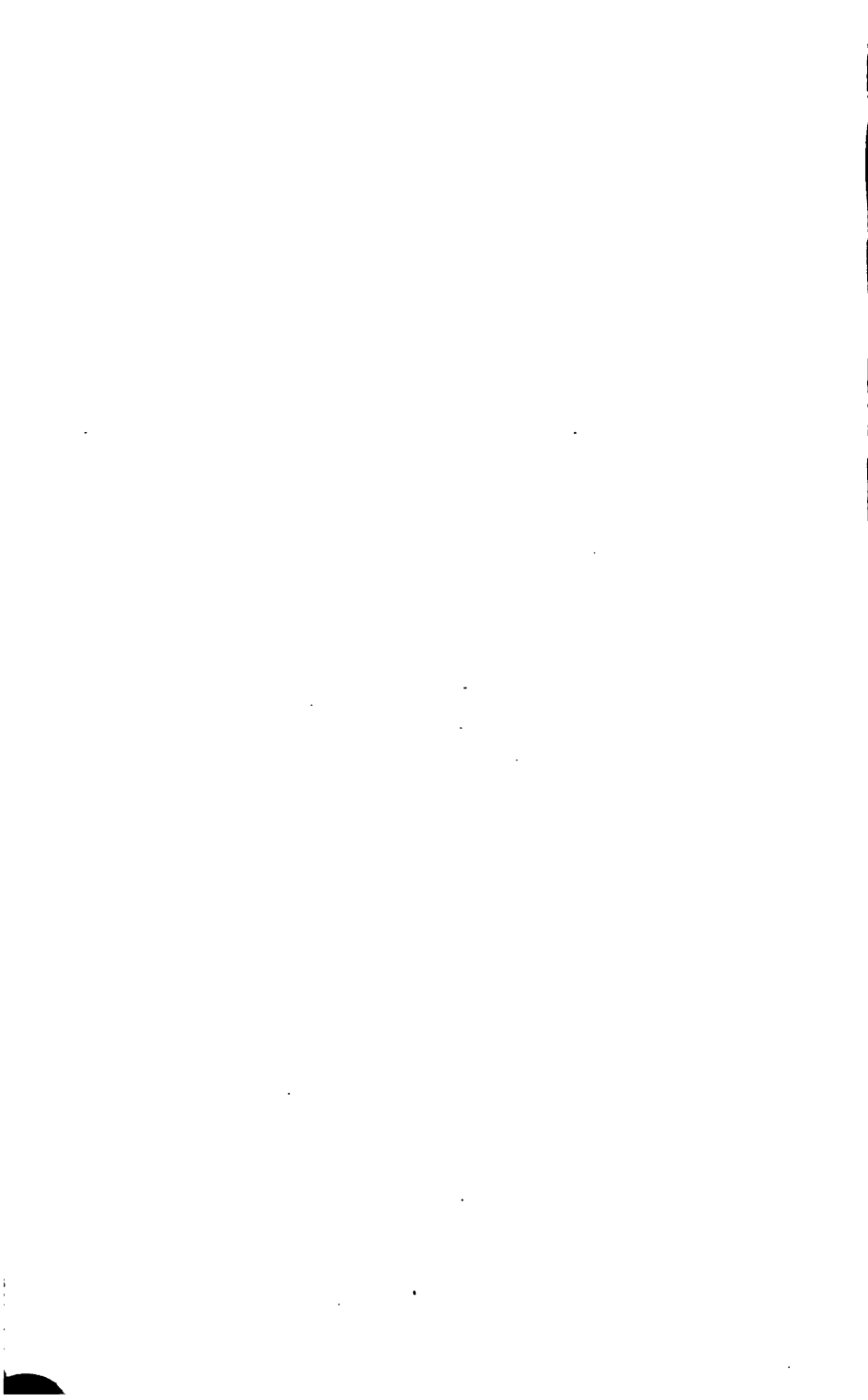
YEARS	MEAN TEMPERATURES	YEARS	MEAN TEMPERATURES	YEARS	MEAN TEMPERATURES
1826	51·4	1841	49·8	1856	49·2
1827	51·0	1842	50·5	1857	51·0
1828	52·2	1843	50·3	1858	49·4
1829	47·9	1844	49·4	1859	50·5
1830	49·8	1845	48·0	1860	47·1
1831	52·1	1846	51·7	1861	49·2
1832	50·1	1847	49·7	1862	50·0
1833	50·4	1848	50·1	1863	50·9
1834	52·2	1849	50·1	1864	48·6
1835	50·6	1850	48·9	1865	50·2
1836	49·5	1851	49·7	1866	50·4
1837	48·8	1852	50·9	1867	49·2
1838	47·8	1853	48·1	1868	52·3
1839	49·8	1854	49·2	1869	50·0
1840	48·9	1855	47·2		

And the mean of all these is $49^{\circ}9$, as the mean temperature of the year—being of the same value as found from the monthly results.

The mean temperatures of the years 1828, 1831, 1834, and 1868, were all above 52° . The year of highest temperature was 1868, and its value was $52^{\circ}3$.

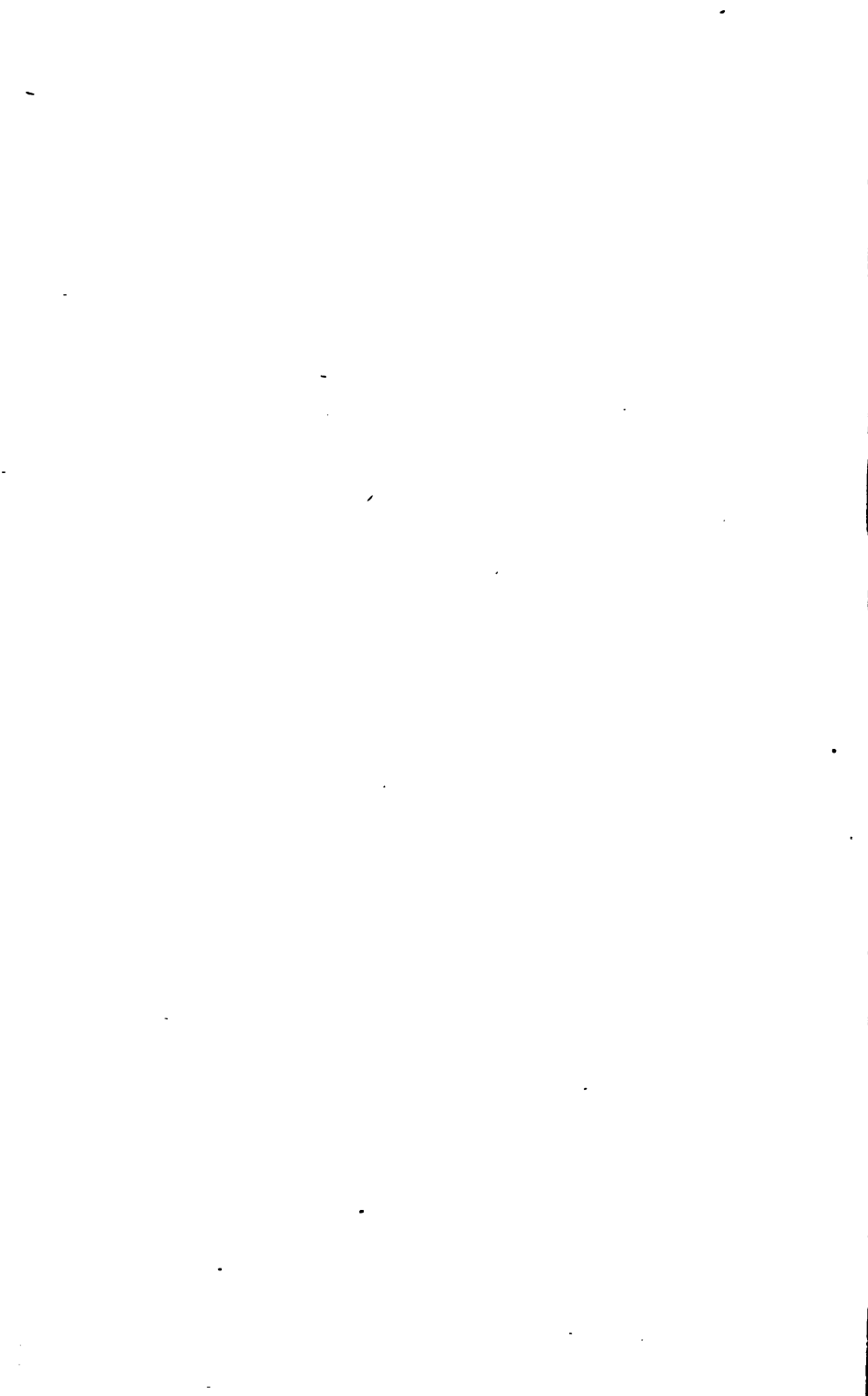
The mean temperatures of the years 1829, 1838, 1855, and 1860, were all below 48° . The year of lowest temperature was 1860, and its value was $47^{\circ}1$.

Thus 44 years, from 1826 to 1869 inclusive, give a mean temperature of $49^{\circ}9$, with a variation, between one year and another, from $47^{\circ}1$ in 1860 to $52^{\circ}3$ in 1868. The difference is $5^{\circ}2$.



ON THE
EXCESS OR DEFICIENCY
ABOVE OR BELOW THE AVERAGE
OF THE
MEAN TEMPERATURE OF EVERY
DAY, MONTH, AND YEAR
FROM ALL
THERMOMETRICAL OBSERVATIONS
TAKEN AT THE
HORTICULTURAL GARDENS
AT
CHISWICK

FROM THE BEGINNING OF 1826 TO THE END OF 1869



*m thion Chiswick in the years 1826-1869;
the Rat*

DAY OF THE MONTH	J R										MEANS OF 44 YEARS
	1826	18468	1862	1863	1864	1865	1866	1867	1868	1869	
1	+ 3.5	- 0.9 0	- 3.3	+ 10.9	- 9.1	- 8.7	+ 1.1	- 11.6	- 8.0	+ 0.4	37.5
2	+ 1.3	- 5.4 5	- 1.0	+ 7.3	- 10.3	- 8.3	+ 7.3	- 16.3	- 6.2	+ 6.9	36.2
3	- 1.9	- 2.3 5	- 0.4	+ 4.7	- 11.3	- 2.8	+ 8.1	- 14.3	- 7.2	+ 9.9	36.2
4	- 2.0	- 0.5 1	- 1.3	+ 5.9	- 10.1	+ 5.7	+ 10.5	- 26.1	- 7.8	+ 6.7	37.0
5	- 1.4	- 6.5 7	- 1.8	+ 8.0	- 14.3	+ 7.5	+ 7.8	- 13.4	- 3.8	+ 8.3	36.4
6	+ 1.7	+ 6.3 4	- 1.1	+ 8.4	- 19.0	+ 3.6	- 1.6	+ 3.7	- 4.4	+ 6.4	35.8
7	- 0.8	+ 9.6 3	- 3.2	- 0.5	- 14.0	+ 3.1	+ 5.3	+ 13.6	- 5.7	+ 9.2	35.9
8	- 5.6	+ 10.0 8	+ 3.8	+ 3.2	- 14.0	+ 8.5	+ 7.0	+ 9.3	- 3.8	+ 14.2	36.1
9	- 9.0	+ 7.0 9	+ 2.7	+ 1.1	- 4.7	+ 7.3	+ 1.8	+ 5.8	- 6.1	+ 10.1	36.0
10	- 9.4	+ 1.9 4	+ 8.4	+ 1.4	- 0.1	+ 10.1	+ 1.1	+ 3.2	- 5.7	+ 4.0	36.9
11	- 9.5	+ 1.2 5	+ 0.1	+ 0.4	+ 1.9	+ 7.9	- 4.2	- 4.6	- 5.0	+ 2.1	36.9
12	- 12.8	- 3.5 3	- 6.1	0.0	+ 1.8	+ 6.7	- 5.5	- 11.7	+ 3.1	+ 3.4	37.0
13	- 15.4	+ 3.6 0	+ 0.5	+ 3.5	- 1.0	+ 1.4	+ 3.4	- 17.1	+ 7.7	+ 0.6	37.3
14	- 16.3	+ 5.3 4	+ 1.1	+ 2.2	+ 0.2	+ 3.5	+ 12.2	- 14.5	+ 11.3	- 3.5	37.1
15	- 18.2	+ 7.9 0	+ 1.2	+ 2.9	- 1.2	+ 1.2	+ 8.5	- 8.4	+ 9.1	+ 8.6	36.1
16	- 17.6	+ 8.3 6	+ 6.2	+ 1.3	- 3.4	- 0.1	+ 10.1	- 5.4	+ 9.9	+ 7.1	36.7
17	- 11.3	+ 6.2 3	+ 0.5	- 0.1	+ 1.7	- 3.6	+ 8.5	- 10.3	+ 10.6	+ 8.2	37.6
18	- 2.3	+ 5.3 7	+ 1.0	+ 0.7	+ 3.7	- 1.7	+ 10.4	- 9.5	+ 8.1	- 1.2	37.1
19	+ 1.9	+ 10.7 5	+ 1.8	+ 8.7	+ 8.8	- 4.4	+ 10.5	- 11.2	+ 5.4	- 1.2	37.5
20	+ 0.5	+ 7.9 0	+ 8.0	+ 4.2	+ 8.0	- 4.6	+ 9.1	- 9.0	- 0.8	- 3.9	37.3
21	- 1.1	+ 11.7 9	+ 4.1	+ 1.1	+ 6.6	- 12.5	+ 12.4	- 10.4	- 1.4	- 4.4	37.7
22	- 3.1	+ 10.8 3	+ 3.1	+ 5.5	+ 10.4	- 9.7	+ 10.1	- 11.9	- 2.2	- 5.5	38.3
23	- 2.4	+ 8.2 8	+ 0.3	+ 6.0	- 1.1	- 4.8	+ 5.5	+ 4.1	- 5.2	- 9.7	38.8
24	- 4.2	+ 8.7 9	+ 9.8	+ 6.2	- 2.5	- 4.0	- 0.7	- 10.0	- 3.3	- 8.4	38.2
25	- 4.9	+ 14.5 9	+ 0.3	+ 5.8	- 1.6	- 6.5	- 0.5	+ 5.3	+ 1.5	- 5.0	38.8
26	- 6.9	+ 9.8 4	+ 6.8	+ 3.9	+ 4.0	- 4.9	+ 1.6	+ 5.3	- 2.6	+ 1.6	38.8
27	- 8.1	+ 7.5 6	+ 0.5	+ 3.4	+ 7.0	- 5.7	+ 2.2	+ 13.4	- 0.8	- 3.1	38.7
28	- 5.1	+ 8.4 7	+ 3.7	+ 2.3	+ 4.1	- 10.5	+ 6.6	+ 9.8	+ 3.0	+ 9.9	38.6
29	- 2.4	+ 8.3 2	- 0.1	+ 6.9	- 11.6	- 10.6	+ 4.4	+ 8.3	- 0.1	+ 6.1	38.8
30	+ 4.6	+ 7.9 4	- 9.8	+ 8.2	- 7.6	- 2.3	+ 3.5	+ 4.6	+ 3.2	+ 8.0	38.9
31	+ 5.4	+ 11.0 9	- 3.2	+ 5.7	- 3.8	- 0.7	+ 9.1	- 0.8	+ 9.4	+ 14.2	39.0
Means	- 5.6	+ 5.73 0	+ 1.1	+ 4.2	- 2.7	- 1.3	+ 5.3	- 4.2	+ 0.1	+ 3.2	

tural Society at Chiswick in the years 1826-1869;

DA ^T											MEANS OF 44 YEARS
MD 59	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	
2.7	- 7.7	+ 6.8	+ 11.6	+ 4.7	+ 2.7	+ 5.5	+ 12.2	+ 7.8	+ 9.2	+ 9.8	39.0
1.8	- 5.1	- 1.5	+ 9.8	+ 9.1	+ 8.3	+ 5.9	+ 6.7	+ 3.1	+ 7.2	+ 0.3	38.9
5.7	- 5.1	+ 1.8	+ 11.2	+ 4.9	+ 7.1	+ 4.1	+ 3.1	+ 0.6	+ 2.1	+ 11.5	38.4
1.8	- 1.0	+ 4.4	+ 13.7	+ 2.2	- 3.4	- 4.2	+ 5.3	+ 2.2	+ 1.9	+ 11.2	39.5
3.9	+ 2.6	+ 4.8	+ 7.8	+ 5.9	- 8.4	- 4.4	+ 5.4	+ 2.7	+ 3.7	+ 9.0	40.5
2.1	- 3.3	+ 5.3	+ 3.4	+ 7.8	- 8.2	- 0.5	+ 11.2	+ 2.1	+ 0.1	+ 6.4	40.2
7.6	- 2.0	+ 4.0	- 7.1	+ 8.3	- 15.0	+ 4.9	+ 5.5	+ 0.3	+ 3.1	+ 10.3	40.6
0.2	+ 3.1	+ 3.5	- 13.9	+ 2.2	- 8.4	- 1.9	+ 3.6	+ 8.5	- 2.6	+ 11.5	39.9
3.8	- 6.5	+ 1.2	- 4.7	- 0.9	- 11.8	- 6.2	+ 7.8	+ 8.5	- 4.1	+ 8.2	39.2
4.9	- 13.0	- 4.1	- 2.3	+ 4.2	- 9.3	- 6.7	+ 5.8	+ 11.8	+ 7.4	+ 11.3	38.4
8.0	- 8.7	- 7.4	- 1.1	+ 5.2	- 3.5	- 12.0	+ 4.5	+ 5.8	+ 4.9	+ 12.0	38.1
8.2	- 8.4	- 6.6	+ 1.7	+ 1.5	+ 2.3	- 8.8	+ 2.1	+ 10.6	- 0.2	+ 5.4	38.1
5.8	- 10.4	- 3.9	- 0.9	- 0.8	+ 9.2	- 10.0	- 3.0	+ 10.0	+ 3.4	+ 3.6	37.6
1.2	- 9.0	- 4.6	- 0.1	+ 0.4	+ 5.2	- 10.1	- 2.4	+ 5.9	+ 6.4	+ 8.5	38.8
5.4	- 5.5	+ 6.4	- 0.7	+ 2.6	+ 8.6	- 15.7	- 0.3	+ 7.0	0.0	+ 6.2	39.5
11.5	- 1.8	+ 5.9	- 1.5	- 6.5	+ 2.8	- 6.7	+ 3.6	+ 11.1	- 3.3	+ 9.1	39.5
9.3	- 0.5	+ 7.4	+ 2.7	- 4.3	- 2.0	- 5.3	- 6.0	+ 6.7	+ 0.3	+ 9.0	39.0
0.2	+ 0.9	+ 6.0	+ 6.9	- 1.0	- 5.7	+ 0.7	- 6.9	+ 6.0	+ 5.9	+ 5.9	38.7
2.2	- 2.7	+ 6.3	+ 10.9	+ 4.1	- 10.2	- 5.0	- 5.5	+ 10.4	+ 4.9	+ 3.7	38.5
6.9	- 4.9	+ 6.1	+ 12.3	+ 2.8	- 10.2	- 6.9	- 3.7	+ 10.8	+ 3.7	+ 3.9	38.4
6.0	- 3.4	+ 6.2	+ 4.2	+ 2.5	- 10.0	- 6.0	- 1.7	+ 8.2	+ 9.1	+ 2.4	39.5
2.4	- 3.3	+ 7.2	+ 8.0	+ 3.0	- 11.0	0.0	+ 0.3	+ 8.5	+ 5.0	- 5.8	40.0
2.3	- 8.0	+ 4.7	+ 5.8	+ 4.7	- 11.3	+ 5.4	+ 1.7	+ 3.6	+ 0.6	- 2.9	39.8
0.7	- 9.3	+ 1.0	- 1.1	+ 4.4	- 7.4	+ 1.8	+ 0.4	+ 4.6	+ 10.2	0.0	40.2
1.5	- 7.3	- 0.7	- 2.9	+ 2.0	- 6.6	- 1.2	+ 1.4	+ 5.7	+ 10.1	+ 2.1	40.6
0.2	+ 4.2	- 1.4	- 6.3	+ 5.5	- 3.9	+ 1.1	- 1.9	+ 1.3	+ 9.3	+ 5.8	40.8
3.0	- 1.5	- 1.9	- 6.8	+ 4.4	- 2.9	+ 1.1	- 6.9	- 2.6	+ 4.8	+ 3.1	41.3
0.7	+ 9.5	+ 2.8	- 3.8	+ 2.3	- 1.7	+ 5.2	- 9.5	- 6.4	+ 8.4	- 0.5	41.1
M 2.4	- 4.2	+ 2.1	+ 2.1	+ 2.9	- 3.7	- 2.7	+ 1.2	+ 5.5	+ 4.0	+ 5.8	

*The observatory at Chiswick in the years 1826-1869;
Mean of the*

DAY OF THE MONTH	M A R C										MEANS OF 44 YEARS
	1826	1827	1828	1829	1830	1831	1832	1833	1834	1835	
1	0.5	-0.4	-1.4	+1.8	-1.3	+3.9	-9.4	-2.8	+2.8	+2.5	41.1
2	8.7	-1.2	-0.2	+6.3	-3.0	+1.0	-10.0	-10.5	+6.7	-0.1	42.3
3	1.0	-5.1	-1.9	+10.7	-3.5	-4.0	-7.8	-5.0	+8.9	-5.1	41.8
4	3.4	-3.9	-2.1	+5.5	+7.6	-2.5	-5.9	-0.7	+10.5	-6.7	41.3
5	4.9	-1.6	-1.5	+8.7	+2.5	-0.9	-8.8	-2.1	+9.3	+4.2	41.0
6	5.3	-3.8	-1.0	+6.0	+5.8	-7.0	-5.8	-6.0	+3.3	+0.3	41.2
7	1.5	-1.5	-1.2	+1.5	+5.9	-6.0	-5.2	-7.7	+4.1	-6.9	41.2
8	0.1	+1.1	+2.8	+0.4	+0.2	-3.6	-1.7	-6.9	-0.9	-8.2	41.3
9	0.6	-5.5	+7.7	-3.5	-7.5	-1.5	-2.3	-1.5	+2.4	-2.1	40.6
10	2.9	-8.7	+3.7	-3.6	-3.6	-6.6	-2.2	-2.6	+1.7	-5.6	40.7
11	2.4	-14.7	+1.6	-4.6	+4.9	-4.6	-4.6	-2.3	+4.3	-5.6	41.2
12	1.8	-4.7	-2.6	-5.2	+0.7	-3.9	-2.1	-8.1	+5.6	-6.0	41.7
13	2.2	-3.3	-2.4	+1.0	+4.0	-3.0	-4.1	-11.3	+8.1	-7.4	42.6
14	3.0	-3.5	-3.0	-2.4	+6.5	-6.1	-9.4	-11.4	+5.0	-7.4	43.0
15	3.9	+0.1	+0.1	-1.5	+3.9	-7.2	-2.8	-8.7	+1.3	-6.5	42.5
16	2.5	+6.7	-3.1	-2.3	-3.0	-8.0	+3.9	-12.0	+3.0	-8.3	43.3
17	4.4	+4.9	-2.1	-3.4	-7.5	-3.1	+2.5	-10.1	+4.3	-4.9	41.9
18	3.0	+2.9	+0.0	-2.7	-3.0	-5.1	+2.0	-9.1	+0.5	-1.6	41.9
19	7.1	+5.3	-0.0	-2.3	+0.9	-7.8	+0.7	-8.3	-0.4	+0.6	42.8
20	9.1	+6.5	-0.7	+7.1	-3.6	-13.2	-3.4	-7.9	+3.5	-4.4	43.0
21	3.5	+2.9	-3.6	+2.2	+0.7	-10.8	-5.8	-5.9	+8.1	-3.0	42.7
22	1.0	+4.2	+3.5	+4.7	-0.9	-7.0	-4.6	-3.0	+6.1	-2.3	42.7
23	3.6	+2.1	+9.2	+8.0	-3.5	-7.9	0.0	+8.4	-1.5	-6.5	42.6
24	0.4	+1.3	+4.8	+7.6	-6.1	-8.9	+4.1	+8.6	-5.0	-3.0	42.4
25	2.4	+5.1	+2.1	+5.9	-3.9	-5.8	+3.2	+7.5	-1.8	-1.6	42.4
26	2.5	+7.1	+4.5	+6.5	-4.6	-8.6	+4.0	+6.5	+5.4	-1.6	42.9
27	0.1	+6.4	+5.6	+2.4	-7.1	-11.3	+5.0	+1.9	+3.5	-8.8	44.4
28	3.4	-0.9	+5.3	+8.4	-2.7	-8.7	+6.4	+1.7	-0.4	-7.8	44.5
29	0.6	-5.5	+3.0	+6.3	-5.9	-8.8	+12.3	-0.8	-1.3	-7.6	44.0
30	2.1	-6.7	+8.3	+2.8	-5.1	-6.3	+6.3	-3.3	-4.0	-7.0	44.4
31	5.2	-10.4	+10.3	0.0	-0.9	-0.1	+3.8	-3.4	+0.1	-4.3	45.1
Means	1.7	-1.0	+1.5	+2.3	-1.0	-5.6	-1.3	-3.8	+3.0	-4.3	

ral Society at Chiswick in the years 1826-1869 ;

DA											MEANS OF 44 YEARS
Me	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	
7.7	+ 0.4	- 2.2	+ 7.3	- 1.3	- 0.7	+ 0.5	- 2.7	+ 7.4	+ 2.8	- 0.9	45.4
2.2	- 5.9	- 2.0	+ 6.6	- 0.9	- 2.8	- 1.3	- 2.9	+ 8.5	+ 1.9	- 1.8	46.0
7.3	- 2.1	- 1.0	+ 3.4	+ 0.5	- 0.7	- 0.8	- 3.3	+ 7.0	+ 4.1	- 5.6	46.7
3.4	- 3.0	- 1.3	+ 2.4	+ 0.7	+ 8.5	- 2.9	- 4.4	+ 3.6	+ 1.6	- 7.1	47.1
3.2	+ 0.1	- 4.8	+ 3.7	- 3.4	- 9.4	+ 3.8	- 1.0	+ 4.0	+ 5.6	+ 0.3	47.6
2.4	- 2.7	- 4.7	+ 3.6	+ 3.0	- 4.0	+ 6.2	0.0	+ 5.8	+ 6.9	- 3.5	48.1
1.9	+ 2.0	- 4.6	+ 0.3	- 1.5	- 2.2	+ 7.2	- 4.0	+ 2.8	+ 6.8	+ 5.6	48.1
7.4	+ 4.6	- 8.0	- 3.8	+ 1.8	+ 0.3	+ 5.8	+ 0.9	+ 0.8	- 1.9	+ 6.8	47.1
3.3	- 4.2	- 7.0	- 1.5	+ 7.4	+ 7.1	+ 4.4	- 3.3	+ 2.7	- 5.5	- 1.0	46.2
2.5	- 7.1	- 5.9	- 0.5	+ 8.5	+ 7.5	+ 9.0	+ 0.7	+ 1.3	- 6.4	+ 8.0	46.6
1.5	- 6.7	- 1.1	- 5.8	+ 6.3	+ 4.9	+ 3.1	+ 3.4	+ 0.2	- 5.2	+ 12.4	46.7
2.9	- 6.0	+ 3.7	- 15.2	+ 5.8	+ 2.3	+ 5.2	+ 6.2	+ 0.6	- 10.0	+ 11.1	47.3
3.6	- 5.8	+ 0.6	- 10.9	+ 4.1	- 8.5	+ 8.3	+ 6.6	+ 3.8	- 2.5	+ 11.1	46.5
3.4	- 8.4	- 2.3	- 8.6	+ 1.7	+ 0.3	+ 4.2	+ 1.4	+ 2.2	- 4.3	+ 15.8	48.0
3.0	- 1.4	- 3.1	- 15.1	+ 0.9	+ 8.0	- 1.3	+ 3.5	+ 3.0	+ 0.5	+ 5.3	48.6
1.0	- 1.0	+ 1.1	- 1.8	+ 5.2	- 2.3	+ 9.0	+ 2.1	+ 2.0	+ 4.2	+ 1.5	48.3
1.2	- 2.6	+ 1.1	+ 0.3	+ 7.6	+ 1.5	+ 8.3	+ 2.8	+ 6.6	+ 5.7	- 0.9	48.2
1.3	- 2.7	- 0.6	+ 3.0	+ 3.7	+ 1.0	+ 6.8	+ 3.6	+ 8.1	+ 0.7	- 2.6	48.7
1.2	- 10.3	- 4.8	+ 5.7	+ 1.4	+ 8.2	+ 6.0	+ 5.2	+ 9.7	+ 2.8	+ 0.7	48.6
2.4	- 7.9	- 6.4	+ 6.5	+ 4.1	+ 7.7	+ 2.2	- 1.2	+ 2.2	+ 2.7	+ 0.6	49.2
2.4	- 11.0	- 9.0	- 0.5	+ 1.9	+ 8.7	+ 5.3	+ 4.3	- 3.0	+ 5.2	+ 5.2	49.4
2.0	- 11.4	- 2.6	+ 3.2	+ 3.6	+ 2.8	+ 10.7	- 1.8	+ 2.3	+ 5.2	+ 1.3	49.7
2.0	- 6.8	- 4.5	+ 2.8	0.0	+ 1.9	+ 6.7	- 2.2	+ 6.0	+ 4.3	+ 5.3	49.5
2.8	- 11.1	+ 1.3	+ 7.9	+ 0.1	+ 0.2	+ 5.6	+ 1.4	+ 5.2	+ 3.4	+ 6.4	49.0
2.0	- 3.9	+ 0.5	+ 10.4	+ 5.4	- 0.5	+ 2.6	+ 6.4	- 0.7	0.0	+ 8.1	49.5
2.4	- 6.5	- 0.1	+ 6.0	+ 3.0	+ 0.7	+ 10.2	+ 10.6	- 0.1	+ 1.3	+ 4.5	49.9
2.3	- 6.8	- 16.8	+ 4.8	+ 6.3	+ 1.3	+ 14.8	+ 14.9	+ 2.0	+ 1.8	+ 10.2	49.2
2.5	- 5.2	- 8.9	+ 4.9	+ 0.6	- 4.5	+ 8.3	+ 8.4	+ 0.7	+ 0.1	+ 7.0	50.1
2.5	+ 0.4	- 9.3	+ 7.6	- 5.3	+ 2.7	- 5.4	- 7.0	+ 1.8	+ 5.3	- 2.0	49.9
3.8	+ 0.5	- 1.1	+ 7.6	- 8.6	- 1.1	- 9.6	- 9.6	+ 1.4	+ 6.2	- 0.2	51.0
Mea	- 4.4	- 3.5	+ 1.1	+ 2.1	+ 1.3	+ 4.6	+ 1.3	+ 3.3	+ 1.4	+ 3.2	

*Observations at Chiswick in the years 1826-1869;
mean of that*

DAY OF THE MONTH	MAY.										MEANS OF 44 YEARS
	1826	1847	1848	1863	1864	1865	1866	1867	1868	1869	
1	- 5	- 1.0	- 2.8	- 8.1	+ 5.7	+ 0.8	- 13.6	+ 1.5	+ 7.2	- 7.1	51.0
2	- 0	- 5.2	- 3.2	- 3.5	+ 5.6	+ 2.1	- 10.9	+ 1.4	+ 5.2	- 3.3	52.2
3	- 2	- 6.7	+ 1.0	+ 2.8	+ 1.5	+ 7.9	- 9.6	+ 2.9	+ 10.1	- 0.5	52.2
4	- 3	- 4.0	+ 4.4	+ 6.0	- 3.5	+ 6.6	- 8.3	+ 5.8	+ 1.5	- 9.6	51.8
5	- 9	- 4.2	+ 5.4	+ 4.0	- 1.1	+ 9.5	- 2.9	+ 6.8	- 3.6	- 3.6	52.5
6	- 5	- 2.4	+ 6.4	+ 1.8	+ 3.0	+ 3.1	+ 0.6	+ 12.8	- 5.7	+ 2.3	52.9
7	- 3	+ 4.6	+ 8.1	+ 1.6	+ 3.0	- 1.1	+ 1.1	+ 12.4	- 1.4	+ 3.4	52.4
8	- 5	+ 1.9	+ 5.5	- 3.1	+ 1.6	+ 4.8	+ 3.1	+ 14.8	+ 3.6	- 1.4	52.2
9	- 3	+ 3.3	+ 7.0	+ 0.3	- 6.9	+ 4.3	+ 2.6	+ 10.3	+ 5.8	+ 0.6	52.3
10	+ 3	+ 9.5	+ 5.5	- 5.1	- 1.1	- 5.1	+ 3.6	+ 12.2	+ 5.6	+ 4.9	52.4
11	- 5	+ 1.5	+ 10.7	+ 1.4	- 3.5	- 4.6	- 0.8	+ 6.9	+ 4.5	0.0	52.8
12	- 2	+ 2.8	+ 9.2	- 0.2	- 4.2	- 2.4	- 5.4	+ 1.2	+ 5.4	- 1.7	53.0
13	- 4	+ 3.5	+ 9.4	+ 0.4	+ 4.1	+ 0.1	- 11.9	- 5.2	+ 4.2	- 1.1	52.7
14	- 5	+ 2.7	+ 12.3	+ 1.3	+ 7.1	- 4.0	- 6.1	- 6.5	+ 6.1	- 1.9	53.1
15	- 3	+ 3.9	+ 11.6	+ 1.1	+ 7.2	- 4.7	- 8.2	- 8.7	+ 7.9	- 1.0	54.1
16	+ 3	+ 2.4	+ 9.9	+ 0.1	+ 7.5	- 3.3	- 7.0	- 8.8	+ 5.6	- 5.1	55.4
17	+ 3	+ 2.7	+ 8.5	- 3.1	+ 8.4	- 0.7	- 4.0	- 5.6	+ 3.2	- 2.1	54.9
18	+ 9	+ 3.0	+ 2.4	- 2.0	+ 10.1	- 2.5	+ 0.7	- 1.5	+ 6.5	+ 0.1	55.1
19	+ 5	+ 1.4	- 1.4	- 9.2	+ 10.6	+ 0.4	+ 1.3	+ 2.0	+ 16.1	- 7.8	55.8
20	- 0	- 0.4	- 3.4	- 6.8	+ 8.6	+ 5.7	+ 0.8	+ 2.7	+ 3.5	- 7.4	56.0
21	+ 0	+ 1.5	+ 3.7	- 7.2	- 1.8	+ 12.8	- 3.2	- 7.4	+ 1.8	- 5.2	56.3
22	+ 5	+ 8.0	+ 6.3	- 7.2	+ 4.5	+ 6.3	- 2.4	- 14.2	+ 3.1	- 4.2	55.3
23	+ 3	+ 14.6	- 0.2	- 7.5	- 5.1	+ 6.3	- 5.0	- 16.5	- 0.5	- 1.8	56.3
24	+ 3	+ 2.2	+ 3.1	- 7.3	- 7.7	+ 1.1	- 9.8	- 12.4	- 1.8	+ 1.3	56.6
25	- 0	- 0.7	+ 5.9	- 7.8	- 1.5	0.0	- 4.2	- 9.5	+ 2.1	+ 3.8	56.3
26	+ 2	+ 0.8	+ 19.0	- 6.4	- 10.0	+ 6.6	+ 1.1	- 0.9	+ 2.3	+ 2.0	56.3
27	+ 2	+ 10.3	- 3.2	+ 0.1	- 6.4	+ 6.4	- 2.4	+ 0.1	+ 2.3	- 4.7	57.2
28	+ 3	+ 17.6	+ 1.6	+ 3.7	- 1.9	+ 2.5	- 0.6	+ 3.6	+ 6.6	- 13.5	56.8
29	- 3	+ 6.3	+ 9.0	+ 7.1	- 7.2	+ 5.5	- 1.7	+ 0.8	+ 9.2	- 12.1	56.5
30	- 2	+ 3.2	+ 0.2	+ 7.2	- 8.5	+ 2.5	- 1.4	+ 4.5	+ 7.8	- 5.9	57.3
31	- 1	+ 7.1	- 0.3	- 0.8	- 4.7	+ 2.6	+ 1.6	+ 3.6	+ 2.0	- 9.1	57.6
Means		+ 2.9	+ 4.6	- 1.5	+ 0.4	+ 2.2	- 3.3	+ 0.3	+ 4.1	- 2.9	

Rural Society at Chiswick in the years 1826-1869;

	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	MEANS OF 44 YEARS
59											
26	-3.0	-0.9	+0.5	+0.9	-8.1	+0.6	+0.8	+4.2	+4.5	-4.5	58.2
51	-5.2	-1.0	+5.1	+3.7	-3.4	-2.7	+2.8	+9.4	+5.6	+0.9	58.9
15	-6.2	-3.2	+0.1	+5.5	-7.6	+0.1	+5.5	-1.4	+2.3	+0.1	59.2
71	-5.6	-3.4	0.0	+3.2	-4.6	+1.5	+2.3	-0.5	-1.7	-4.9	58.4
31	-6.9	-4.3	-1.3	-1.5	+1.0	+4.9	-1.2	-1.9	-1.3	+1.8	59.1
51	-5.6	-6.7	+1.5	-2.0	-0.9	+9.5	-1.3	-0.7	+4.6	+6.9	59.6
56	-9.7	-5.4	+1.1	-2.9	+4.4	+1.2	+4.1	+0.5	+1.1	+12.3	59.0
52	-4.8	-7.2	-1.4	-2.7	+5.2	+3.2	+6.3	-0.6	-2.0	+0.5	59.2
25	-9.3	-7.1	-3.6	-2.8	-5.6	+6.0	+5.4	-0.7	+0.6	-1.4	59.8
13	-7.2	-4.0	-2.5	-1.8	-0.6	+3.8	+9.7	+5.2	-2.6	-5.6	60.0
2	-3.7	-1.5	-0.9	-3.7	-6.3	-5.8	+1.8	+8.2	+3.0	-5.8	60.0
24	-6.9	-0.8	-4.6	-4.9	-1.4	-7.1	-1.8	+10.3	+2.8	-3.2	60.1
19	-7.2	+5.9	-4.1	-5.7	-5.5	+1.0	-4.2	-0.5	+5.3	-0.8	60.7
25	-7.5	+8.3	-9.0	-3.9	-1.6	+0.7	-0.3	-3.1	+5.1	-9.8	60.6
13	-6.3	+5.7	-4.5	-0.3	-3.2	+0.2	-2.5	-6.7	+4.3	-8.2	61.0
12	-3.0	+4.1	-5.3	-1.2	-0.3	-1.1	-1.6	-7.3	+4.4	-11.3	60.7
11	-8.1	+0.7	-1.3	+0.8	+1.3	-4.7	-8.3	-5.3	+7.7	-10.8	60.4
13	-5.5	+6.2	-9.0	+2.0	+0.5	-7.1	-5.4	+2.8	+4.0	-8.7	60.2
17	-3.3	+9.4	-3.9	-0.9	+0.3	-5.8	-3.0	+1.5	+4.1	-8.1	60.1
10	-2.5	+4.6	-5.0	+1.3	+1.4	-1.4	+0.3	-5.2	+8.4	-10.1	61.3
38	-2.6	+5.4	-6.9	+1.9	-2.4	0.0	+5.6	-5.6	+6.9	-10.8	62.2
31	-2.1	+2.2	-2.7	+0.9	-0.5	+0.7	-0.1	-3.5	+0.1	-5.6	61.4
14	-1.5	+1.8	-3.4	+3.3	-6.3	+7.3	+2.9	-1.8	-1.2	-7.2	61.9
10	+1.3	+2.0	-6.8	+3.2	-3.7	-0.8	-0.3	-2.7	+2.1	-3.7	61.5
16	-4.2	-4.6	-5.6	-0.5	+1.5	+0.2	+2.8	-1.2	+4.6	-3.3	61.5
33	-3.3	-4.5	-2.3	-0.2	-3.9	-8.3	+3.2	-4.4	+2.3	-1.7	62.0
31	-5.5	-1.0	-5.8	-3.7	-7.7	+1.4	+8.4	+0.8	+7.7	+0.2	62.4
10	-5.1	+2.7	-2.9	-4.6	-1.3	-0.1	+9.0	-6.0	+5.8	-5.8	62.3
26	-6.4	-0.8	-1.4	-0.6	+3.0	-2.4	+5.1	+1.0	+2.1	-5.4	61.4
23	-8.7	-3.9	-6.5	-1.7	-7.0	-5.0	+7.3	+4.0	+3.3	-2.2	61.2
24	-5.2	-0.1	-3.1	-0.6	-2.1	-0.3	+1.8	-0.4	+3.1	-3.9	

the observatick in the years 1826-1869;
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DAY OF THE MONTH	JUL										MEANS OF 44 YEARS
	18246	1847	184863	1864	1865	1866	1867	1868	1869		
1	+ 8 ⁰ 2.2	+ 0.6	- 4 ⁰ 0.3	- 8.2	- 2.2	- 2.2	+ 5.3	- 1.5	- 3.0	61.3	
2	+ 7 ⁰ 4.5	- 5.1	- 4.1.8	- 1.9	+ 2.4	- 5.5	+ 1.0	+ 3.5	- 3.0	62.0	
3	+ 10 ⁰ 1.8	- 0.8	- 2.2.8	- 6.6	+ 0.2	- 6.5	+ 0.7	+ 3.2	- 4.0	62.6	
4	+ 11 ⁰ 9.9	- 1.3	- 2.2.9	- 5.6	+ 6.8	- 5.4	- 1.0	- 2.7	+ 1.0	63.5	
5	+ 7 ⁰ 0.1	+ 4.3	+ 1.0.4	- 9.9	+ 3.6	- 6.1	- 1.4	- 4.6	+ 1.9	64.0	
6	+ 9 ⁰ 2.1	+ 7.7	+ 8.0.3	- 3.3	+ 7.4	- 6.3	- 3.2	+ 3.2	+ 1.4	63.9	
7	+ 8 ⁰ 2.3	+ 2.0	+ 1.4.9	- 5.1	+ 1.6	- 5.3	- 3.0	+ 2.7	+ 0.7	62.9	
8	+ 7 ⁰ 1.0	0.0	- 2.2.1	- 6.9	+ 1.0	- 1.5	- 1.6	+ 8.1	+ 5.2	62.5	
9	+ 7 ⁰ 0.1	+ 3.2	- 4.5.5	- 5.4	+ 1.1	+ 4.8	- 0.3	+ 8.1	- 0.5	62.5	
10	+ 6 ⁰ 2.1	+ 6.4	- 2.6.0	- 5.1	- 5.6	+ 4.7	- 1.0	+ 5.1	+ 1.7	62.7	
11	+ 3 ⁰ 1.6	+ 6.1	- 2.4.4	+ 3.1	- 5.9	+ 5.4	- 0.3	+ 5.3	+ 2.1	63.5	
12	+ 2 ⁰ 0.1	+ 8.2	+ 0.5.1	- 6.3	- 5.0	+ 9.1	+ 0.3	+ 3.7	+ 9.5	63.9	
13	+ 0 ⁰ 7.1	+ 11.0	+ 3.4.7	- 6.9	- 5.2	+ 9.3	- 1.5	+ 3.3	- 3.7	64.0	
14	+ 1 ⁰ 5.6	+ 11.8	+ 6.1.8	- 1.3	- 0.8	+ 5.4	- 3.5	+ 6.2	+ 0.3	64.3	
15	+ 0 ⁰ 1.1	+ 8.0	- 4.4.9	- 0.4	+ 4.0	+ 4.4	- 4.4	+ 6.6	+ 1.7	64.3	
16	- 3 ⁰ 0.5	+ 5.9	- 0.3.8	- 1.5	+ 6.2	+ 1.6	- 4.0	+ 9.4	+ 8.4	63.7	
17	+ 0 ⁰ 2.6	- 1.8	- 0.6.4	- 0.3	- 0.8	- 1.1	- 2.1	+ 7.3	+ 10.6	64.4	
18	+ 3 ⁰ 2.4	- 3.4	+ 1.6.4	- 2.1	- 3.2	- 3.3	- 4.1	+ 10.4	+ 10.6	63.2	
19	+ 4 ⁰ 0.3	- 1.4	+ 2.4.4	+ 9.0	- 1.8	- 0.7	- 5.8	+ 9.2	+ 2.1	62.4	
20	+ 0 ⁰ 1.8	+ 4.5	- 1.3.6	+ 6.2	+ 1.2	- 3.7	- 1.7	+ 12.6	- 3.7	62.3	
21	- 1 ⁰ 1.8	+ 4.4	- 1.7.6	+ 3.4	+ 4.5	- 2.4	+ 1.1	+ 15.4	+ 3.2	62.5	
22	+ 0 ⁰ 2.5	- 1.8	+ 1.6.0	+ 0.7	+ 3.2	- 8.1	- 1.6	+ 12.5	+ 12.4	63.2	
23	- 7 ⁰ 4.9	- 2.8	+ 1.5.6	+ 3.4	- 0.1	- 5.0	- 0.3	+ 5.6	+ 4.4	63.4	
24	- 1 ⁰ 2.9	+ 1.3	- 1.5.8	+ 3.9	+ 4.1	- 3.8	- 1.2	+ 4.4	+ 3.8	62.8	
25	+ 1 ⁰ 1.8	- 4.7	- 3.2.9	- 3.0	+ 4.3	- 3.9	- 0.2	+ 6.1	+ 5.0	62.6	
26	+ 0 ⁰ 2.5	- 1.2	- 2.7.4	+ 0.4	+ 4.4	+ 0.8	- 9.3	+ 6.5	+ 2.7	62.6	
27	- 1 ⁰ 4.1	+ 1.1	- 2.2.8	+ 1.4	+ 6.2	- 2.8	- 10.5	+ 9.7	+ 0.7	63.3	
28	- 0 ⁰ 6.2	+ 2.7	- 0.2.0	- 1.0	- 5.0	+ 1.3	- 10.0	+ 9.0	- 7.7	63.7	
29	+ 2 ⁰ 0.1	+ 6.6	+ 1.1.0	+ 4.0	+ 2.6	- 2.2	- 6.8	- 2.1	- 0.1	63.2	
30	+ 7 ⁰ 2.5	+ 2.0	+ 0.1.1	+ 3.9	- 1.4	- 6.2	- 4.2	+ 4.5	+ 5.4	62.9	
31	+ 10 ⁰ 3.5	+ 2.5	- 0.3.7	+ 4.3	- 3.6	- 7.2	- 4.9	+ 3.1	+ 3.6	62.9	
Means	+ 3 ⁰ 2.7	+ 2.5	- 0.1.0	- 1.3	+ 0.8	- 1.3	- 2.6	+ 5.6	+ 2.3		

ultural Society at Chiswick in the years 1826-1869;

359	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	MEANS OF 44 YEARS.
0.4	-3.2	-1.7	+0.1	-1.4	+0.1	-9.9	+0.5	-5.3	+8.6	+0.1	63.8
1.2	-5.2	+3.0	-0.5	+1.1	-4.6	-11.2	+0.1	-12.1	+10.0	-4.6	63.6
3.6	-3.0	-3.8	-2.0	+3.5	-0.6	-12.0	-2.9	-4.8	+8.9	-4.4	63.5
1.5	-3.8	-0.6	-0.1	+1.9	+2.9	-10.0	-4.3	-5.1	+10.3	+2.2	63.8
2.1	-4.2	+0.2	+1.3	+0.9	+9.1	-5.0	-6.6	-1.1	+10.5	-0.9	63.3
1.0	-6.2	-0.4	-1.3	+2.3	+5.8	-0.2	-5.0	-4.1	+8.2	-4.4	62.5
6.1	-8.4	+2.3	-6.1	+5.8	+0.6	+0.9	-4.4	-3.4	+5.3	-4.3	63.1
3.4	-7.6	-1.2	-8.2	+5.8	+4.4	-2.6	-7.1	+0.4	+1.9	-1.5	62.8
3.3	-6.3	+0.4	-2.8	+4.3	-1.9	-3.7	-5.7	-1.7	+6.8	+0.2	63.0
2.5	-6.7	+4.5	-5.9	+5.4	-9.0	+2.7	-5.9	-3.2	+5.6	-5.7	63.2
3.4	-2.9	+4.8	-3.2	+3.1	-8.4	-1.7	-2.4	+0.6	+4.6	-8.0	63.7
0.6	-6.4	+11.1	+0.6	-1.6	-3.4	-2.9	-2.7	+4.3	-0.9	-5.7	63.5
4.7	-4.2	+3.1	+1.9	+3.3	-0.7	-0.5	-0.9	+5.3	+1.2	-3.8	63.0
2.8	-2.9	+5.5	-5.5	+1.8	+0.5	-3.0	-2.3	+13.9	+1.6	-4.2	62.3
2.7	-1.0	+4.4	-2.7	+3.5	+1.7	-1.9	-2.4	+4.7	+4.1	+1.0	62.3
0.7	-3.0	-4.8	-3.2	+2.6	+0.1	-2.2	-6.6	+0.6	+3.2	+0.9	62.2
0.7	-5.5	-2.4	-5.4	-0.4	-1.0	-0.6	-7.6	+1.3	+2.4	-4.2	61.7
1.8	-5.9	+2.9	-4.8	-8.4	-6.7	-1.2	-4.7	-0.9	+2.1	-1.8	62.2
3.9	-2.3	-3.3	-1.4	-7.5	-4.5	-5.1	+0.4	+6.7	+1.6	-5.6	62.4
4.5	-2.6	-3.9	-0.7	-5.0	-3.9	-0.4	+1.1	+2.1	-1.7	-3.6	62.2
1.2	-1.4	-4.8	+3.7	-3.2	-7.1	-0.5	-1.0	+4.5	-0.2	-1.9	61.3
1.5	-4.3	+1.2	-1.2	-0.7	-4.8	+1.9	+1.1	-2.4	-1.7	+3.5	61.3
3.4	-5.8	+2.3	-3.5	+4.2	-11.3	-1.3	+3.5	-0.4	-1.7	+3.4	60.8
7.0	-4.8	-1.5	-2.8	+1.4	-8.5	+2.8	+2.5	+2.4	-1.1	+4.4	60.5
10.3	-2.2	+1.3	-0.8	-3.6	-10.6	-0.2	+1.1	+3.4	-4.7	+8.3	61.0
5.4	-2.2	+1.3	-0.2	-2.7	-8.6	-1.0	+5.8	-4.2	-3.4	+8.8	61.1
1.7	-6.3	+3.7	-1.7	-1.2	-9.3	+0.1	+4.0	-4.6	+0.3	+9.3	61.7
0.4	-2.8	+2.7	-3.1	+0.6	-0.1	+0.2	-0.6	-2.6	-3.7	+9.5	61.5
0.3	-0.8	+4.3	-4.9	-0.1	+2.7	-7.7	-5.3	+5.0	-1.4	-3.0	60.1
6.7	-1.7	-0.8	-1.8	+2.1	+5.4	-3.7	-1.4	+1.7	+3.6	-5.4	60.4
8.1	-1.5	+0.7	+1.0	-1.9	+1.6	+5.2	+0.3	+8.6	+3.9	-5.7	60.1
0.9	-4.0	+1.0	-2.1	+0.5	-2.3	-2.4	-1.9	+0.3	+2.6	-0.9	

*the observations viswick in the years 1826-1869;
mean of that day*

DAY OF THE MONTH	S E P T E M B E R										MEANS OF 44 YEARS
	1847	1848	1844	1863	1864	1865	1866	1867	1868	1869	
1	- 3.6	- 3.7	+ 3.1	0.6	- 0.5	- 0.1	+ 0.6	+ 9.1	+ 3.8	- 6.1	59.6
2	- 5.6	- 1.6	+ 6.1	1.8	- 2.6	+ 4.4	- 3.2	+ 7.9	+ 2.0	- 6.8	59.6
3	- 7.4	+ 0.2	+ 6.6	1.0	+ 1.1	+ 5.7	- 4.8	+ 4.8	+ 5.3	- 5.8	59.8
4	- 9.4	+ 2.0	+ 7.4	1.7	+ 2.8	+ 4.8	+ 1.4	+ 5.6	+ 6.3	+ 2.0	59.7
5	- 7.9	+ 9.1	+ 5.3	5.6	- 1.9	+ 4.0	+ 2.0	0.0	+ 6.6	+ 7.6	59.5
6	- 9.0	- 0.9	+ 2.8	1.4	+ 6.3	+ 5.6	+ 1.3	+ 2.0	+ 11.2	+ 4.1	59.5
7	- 5.3	- 2.7	- 2.8	0.4	+ 7.6	+ 5.1	+ 0.5	+ 1.8	+ 11.6	+ 6.2	60.0
8	- 1.3	+ 2.2	- 4.4	3.7	+ 8.6	+ 11.8	+ 0.4	+ 0.7	+ 0.2	+ 7.7	59.9
9	- 2.2	+ 0.9	- 0.4	2.0	- 2.5	+ 6.0	+ 0.7	+ 2.9	+ 0.2	+ 6.2	59.6
10	+ 0.3	- 0.8	+ 3.3	4.9	- 5.4	+ 10.7	+ 1.9	- 0.3	+ 4.1	+ 1.4	58.5
11	+ 1.5	- 5.6	- 0.9	4.1	- 9.8	+ 12.1	- 1.5	+ 5.5	+ 4.1	+ 8.0	57.4
12	+ 6.4	- 10.3	- 5.8	0.1	- 7.8	+ 10.3	- 3.0	+ 6.2	+ 6.0	- 2.4	57.5
13	- 0.6	- 7.3	- 3.3	2.1	- 2.1	+ 10.0	+ 0.9	+ 0.2	+ 4.0	- 0.4	57.8
14	- 5.4	- 4.9	+ 0.5	1.7	- 3.1	+ 7.9	- 0.1	- 0.9	+ 1.2	+ 5.0	56.8
15	- 3.4	- 8.4	- 0.3	1.8	- 2.4	+ 10.5	- 1.6	+ 0.1	+ 0.6	+ 1.1	57.2
16	+ 0.3	- 6.3	+ 2.0	0.1	- 1.0	+ 9.0	- 3.5	- 4.6	- 1.4	+ 2.3	58.7
17	- 6.3	- 3.7	- 3.3	8.9	- 3.8	+ 4.1	- 4.0	- 4.1	+ 4.1	+ 3.1	58.1
18	- 9.7	- 4.5	- 7.4	3.0	- 2.1	+ 3.0	- 2.0	+ 4.1	+ 2.6	+ 5.2	56.7
19	- 4.7	- 4.4	- 4.4	4.5	- 3.0	+ 3.5	+ 0.4	+ 2.8	+ 2.4	- 1.8	56.7
20	- 4.4	+ 0.9	- 2.1	3.4	+ 0.8	+ 6.4	- 6.4	+ 0.9	+ 4.1	- 4.2	56.2
21	- 0.7	+ 2.5	+ 0.4	4.5	+ 2.2	+ 2.3	- 2.2	- 1.1	+ 5.2	- 3.3	55.9
22	+ 2.9	+ 6.3	+ 2.1	3.8	+ 2.0	- 0.6	- 7.7	+ 0.2	+ 3.1	+ 0.9	56.4
23	+ 3.0	+ 1.9	0.0	8.2	+ 1.4	0.0	- 5.4	- 1.5	+ 0.6	+ 4.7	56.5
24	- 3.7	+ 3.3	+ 0.5	7.2	+ 1.7	+ 4.4	- 3.3	- 4.9	+ 2.1	+ 9.5	56.0
25	+ 1.2	+ 5.8	- 0.1	4.0	+ 0.1	+ 4.6	- 3.7	- 7.1	- 1.5	+ 7.1	55.7
26	- 4.6	+ 2.4	+ 1.8	6.2	- 0.6	+ 5.4	+ 1.7	- 3.0	+ 3.2	+ 2.5	55.6
27	- 10.5	+ 2.4	+ 5.9	8.5	- 2.0	+ 3.5	+ 1.5	- 2.8	+ 1.8	+ 0.9	55.8
28	- 8.1	+ 0.1	+ 4.8	5.9	- 1.1	- 1.2	+ 4.4	+ 1.7	+ 2.5	+ 2.6	55.5
29	- 1.3	- 1.6	+ 6.2	8.0	- 0.4	+ 1.7	+ 5.2	+ 0.2	+ 2.7	+ 9.6	55.8
30	- 0.8	+ 1.8	+ 2.1	3.9	- 0.1	- 1.8	+ 2.2	+ 2.2	+ 1.0	+ 5.2	55.2
Means	- 3.3	- 0.8	+ 0.9	3.1	- 0.5	+ 5.1	- 0.9	+ 0.9	+ 3.3	+ 2.2	

tural Society at Chiswick in the years 1826-1869;

DAY											MEANS OF 44 YEARS
TH Mo	359	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
5.7	- 5.1	+ 7.5	+ 1.5	- 0.8	0.0	+ 5.4	+ 1.8	- 5.7	- 0.8	+ 4.1	54.4
6.3	- 2.3	+ 1.4	+ 8.6	- 1.5	- 3.4	+ 7.0	+ 4.6	- 4.5	- 3.9	+ 1.9	54.8
5.6	- 1.7	+ 3.8	+ 8.0	+ 4.5	- 6.1	+ 3.5	+ 7.6	- 9.4	- 6.6	+ 1.7	54.4
9.8	- 2.7	+ 4.1	- 0.3	+ 4.6	- 5.6	+ 0.6	+ 4.5	- 11.6	- 3.1	+ 0.2	53.7
9.6	+ 0.1	+ 6.4	+ 2.0	- 4.0	- 4.2	- 0.7	+ 2.7	- 12.2	+ 1.5	- 2.5	52.4
8.5	+ 3.5	+ 5.3	+ 8.8	- 4.4	- 7.7	- 0.2	+ 4.1	- 8.7	+ 1.3	+ 2.2	52.1
9.7	+ 2.1	+ 7.8	- 0.9	+ 3.2	- 2.6	+ 1.6	+ 3.4	- 7.7	- 3.8	+ 4.4	53.3
6.6	- 2.3	+ 10.2	+ 4.3	+ 6.6	- 0.7	+ 3.3	+ 2.3	- 9.0	- 1.8	+ 9.1	52.1
6.6	- 6.5	+ 7.2	+ 4.5	- 0.1	- 0.6	+ 7.0	- 0.5	- 8.7	- 1.2	+ 8.9	51.4
2.8	- 6.6	+ 7.6	+ 5.2	+ 5.1	- 1.9	+ 5.7	+ 0.6	- 10.5	- 1.2	+ 9.0	52.7
1.2	- 9.8	+ 4.9	+ 5.1	+ 3.2	- 1.4	+ 3.9	- 1.0	- 8.3	- 4.0	+ 6.7	52.9
2.9	- 12.5	+ 7.6	+ 4.4	+ 3.0	+ 0.9	- 0.6	- 2.3	- 7.8	+ 1.0	+ 8.6	51.6
0.9	- 3.8	+ 9.9	+ 2.6	+ 5.9	+ 0.1	- 3.4	- 3.9	- 5.6	- 0.8	+ 6.4	51.4
3.8	- 4.2	+ 8.7	+ 8.2	+ 4.5	- 1.1	- 1.5	- 2.1	+ 0.5	- 3.2	- 2.0	51.3
5.4	- 0.2	+ 4.9	+ 7.2	+ 2.1	- 3.6	- 2.6	- 4.7	+ 5.7	+ 0.6	+ 3.2	50.8
6.4	+ 0.6	- 0.5	+ 3.0	+ 6.0	+ 0.5	- 1.2	- 10.6	+ 5.5	- 0.5	- 0.5	50.0
0.5	- 2.5	- 1.7	+ 2.7	+ 4.7	+ 4.3	+ 0.8	- 1.0	+ 4.0	- 5.1	- 8.1	49.8
1.2	+ 1.6	- 1.5	- 6.6	+ 1.9	+ 2.6	- 0.5	+ 0.6	+ 2.3	- 8.0	- 8.7	49.6
1.3	+ 2.8	- 0.2	+ 1.0	+ 7.0	+ 6.2	- 7.2	+ 6.9	- 3.8	- 11.4	- 11.7	50.0
0.8	- 2.1	+ 1.2	- 6.9	+ 4.6	+ 3.6	- 8.2	+ 6.2	- 3.3	- 10.0	- 7.0	49.4
12.6	- 5.0	+ 3.4	+ 0.2	+ 4.2	+ 3.5	- 6.7	+ 6.4	+ 1.7	- 7.0	- 2.0	49.4
14.2	0.0	+ 2.8	- 0.3	+ 2.8	+ 2.2	- 2.8	- 1.2	+ 9.2	- 8.2	- 5.2	50.4
18.6	+ 5.8	+ 2.9	+ 0.4	+ 3.2	+ 1.5	- 0.6	- 1.6	+ 4.5	- 5.2	- 0.7	50.2
18.6	+ 5.9	+ 8.2	- 1.4	- 4.6	- 4.3	+ 4.1	+ 2.1	+ 4.4	- 0.6	- 1.9	48.5
9.0	+ 8.9	+ 9.2	- 5.7	- 4.3	+ 2.8	- 2.2	- 2.8	+ 2.3	+ 2.2	- 3.3	47.8
5.0	+ 5.9	+ 3.2	+ 2.1	- 2.5	+ 6.9	+ 1.9	- 1.0	+ 5.8	- 0.5	- 7.3	46.5
13.0	+ 4.8	+ 3.5	+ 2.0	- 3.5	+ 7.5	- 1.5	- 2.4	- 0.7	- 5.5	- 12.1	46.7
3.5	+ 7.5	+ 0.9	- 2.1	+ 1.6	+ 4.9	- 6.3	+ 0.4	- 4.0	- 3.6	- 9.5	46.3
3.2	+ 2.9	+ 1.8	- 2.3	+ 1.5	+ 6.9	+ 1.6	- 2.8	+ 8.5	+ 2.2	- 4.1	45.5
7.4	+ 3.3	+ 2.0	- 9.3	- 0.8	- 1.4	+ 0.7	+ 4.5	+ 6.4	+ 1.4	- 3.3	46.5
0.0	- 1.2	+ 1.0	+ 1.5	- 1.5	- 3.8	- 2.0	- 2.3	+ 7.3	+ 5.1	- 2.6	46.7
M	0.3	- 0.4	+ 4.3	+ 1.5	+ 1.7	+ 0.2	- 0.1	+ 0.6	- 1.7	- 2.6	- 0.9

the observations taken at Wick in the years 1826-1869;
 on of that day for

N O V E M B E R.											M E A N S O F 44 Y E A R S.
DAY OF THE MONTH	1847	1848	1849	1863	1864	1865	1866	1867	1868	1869	
1	+ 5.3	- 3.6	+ 0.8	+ 3.2	- 3.1	- 8.5	+ 2.9	+ 6.7	+ 5.2	+ 1.2	46.5
2	+ 3.6	- 2.2	+ 0.8	+ 1.5	- 3.9	- 6.4	+ 7.4	- 6.9	+ 2.1	+ 5.4	46.3
3	+ 1.7	- 1.6	+ 4.1	+ 2.6	- 2.9	- 6.7	+ 5.7	- 4.0	+ 5.3	+ 3.6	45.2
4	+ 2.2	- 13.4	+ 1.8	+ 11.5	- 8.4	- 6.5	+ 3.4	+ 2.5	+ 4.3	+ 2.8	44.9
5	+ 4.6	- 7.9	- 2.1	+ 4.1	- 3.2	- 6.9	+ 9.0	- 4.7	- 6.9	+ 1.4	45.6
6	+ 7.3	+ 0.1	- 4.4	+ 5.3	- 4.6	- 3.2	+ 5.7	- 9.0	- 11.7	- 3.0	45.0
7	+ 11.2	- 5.9	+ 4.0	+ 1.1	- 11.2	- 4.1	+ 8.2	- 7.5	- 10.3	- 2.3	44.6
8	+ 12.7	- 10.0	+ 11.9	+ 3.5	- 5.8	+ 2.0	+ 9.3	- 4.3	- 9.9	+ 3.3	43.6
9	+ 2.5	- 7.3	+ 10.7	+ 3.1	- 4.8	+ 1.3	- 1.5	+ 0.1	- 3.5	+ 1.5	42.5
10	- 0.8	- 5.8	+ 5.2	+ 17.8	- 10.9	- 3.3	+ 0.4	+ 2.2	- 2.5	- 8.6	42.8
11	+ 8.8	- 1.2	+ 8.2	+ 17.4	- 10.8	- 0.8	+ 6.7	- 5.0	- 0.7	- 8.4	42.8
12	+ 5.4	- 0.9	+ 3.9	+ 3.7	- 4.4	+ 0.6	+ 9.3	- 1.8	- 0.5	- 3.5	42.2
13	+ 3.9	- 2.9	+ 5.6	- 3.6	+ 3.7	- 1.9	+ 7.3	- 4.1	- 1.7	+ 6.3	42.6
14	+ 7.3	- 4.4	+ 2.6	- 4.0	+ 2.6	+ 6.8	+ 0.4	+ 7.3	- 0.5	+ 11.6	42.1
15	+ 10.2	- 9.7	- 1.1	- 7.4	+ 0.2	+ 1.5	+ 1.3	+ 9.9	- 1.6	+ 8.3	42.2
16	+ 3.6	- 5.6	- 2.6	+ 8.9	- 0.1	- 0.1	+ 7.3	+ 2.4	- 2.6	+ 9.6	42.2
17	- 2.2	+ 3.1	- 4.8	- 9.3	+ 7.2	+ 9.0	- 5.3	- 1.8	- 1.1	- 4.9	41.3
18	- 6.4	+ 1.6	+ 5.9	+ 7.2	+ 5.6	+ 1.7	+ 2.0	+ 0.1	+ 1.3	- 2.6	41.5
19	- 10.0	- 4.1	+ 3.9	+ 4.3	+ 5.1	+ 7.3	- 4.6	- 2.3	+ 0.3	+ 4.0	41.4
20	- 6.7	+ 7.4	+ 2.6	+ 1.0	+ 5.7	+ 10.0	- 9.0	- 4.0	- 7.0	- 5.2	41.7
21	- 3.1	+ 2.2	- 0.2	- 3.9	+ 2.6	+ 7.4	- 6.5	- 5.2	- 3.0	- 4.4	42.8
22	+ 3.5	+ 7.1	- 2.8	+ 3.7	+ 1.4	+ 7.5	+ 1.7	- 3.2	+ 2.9	+ 1.0	42.5
23	+ 6.4	+ 5.0	+ 3.4	+ 6.9	+ 1.1	+ 8.5	+ 2.4	- 1.6	+ 2.0	- 1.9	41.8
24	+ 6.0	- 2.3	- 4.3	+ 10.1	- 1.4	+ 7.6	+ 1.6	- 3.5	- 1.4	- 1.0	40.7
25	+ 8.1	- 2.5	- 5.7	+ 8.1	- 0.9	+ 9.9	+ 6.1	- 2.3	+ 2.3	+ 0.2	40.2
26	+ 1.4	+ 7.9	- 10.5	- 8.2	- 2.2	+ 1.6	+ 1.6	+ 1.0	+ 1.6	+ 3.2	41.1
27	+ 5.0	+ 3.0	- 12.2	- 4.1	+ 1.7	- 1.7	+ 4.1	- 7.9	+ 0.6	+ 3.7	40.2
28	+ 3.4	+ 8.1	- 14.4	- 0.9	+ 6.6	+ 4.1	- 6.8	- 12.8	- 2.7	+ 0.4	41.4
29	- 1.8	+ 11.5	- 3.9	- 4.9	+ 0.1	+ 2.4	- 1.8	- 8.5	- 5.1	- 3.9	41.2
30	+ 12.1	+ 1.5	- 1.2	- 6.7	+ 1.4	+ 2.2	- 6.9	+ 0.3	0.0	- 8.5	41.5
Mean	+ 3.5	- 1.1	+ 0.2	+ 2.1	- 1.1	+ 1.4	+ 2.0	- 2.3	- 1.4	+ 0.3	

Agricultural Society at Chiswick in the years 1826-1869;

DAY THE MON												MEANS OF 44 YEARS
	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	
	0.8	+ 0.7	- 0.5	- 1.7	- 0.7	- 0.1	+ 1.7	- 7.4	+ 0.6	+ 1.5	- 11.5	41.5
	8.4	+ 4.2	- 7.0	+ 4.1	+ 2.6	- 4.9	+ 0.9	- 2.8	- 12.4	+ 4.2	- 9.7	40.8
	11.2	+ 2.9	- 11.8	+ 2.5	+ 3.0	+ 5.7	+ 1.3	+ 6.0	- 8.0	+ 5.5	- 10.7	41.4
	1.6	+ 2.7	- 8.0	+ 2.1	+ 0.6	+ 6.0	+ 1.1	+ 10.6	- 11.1	+ 11.3	- 10.2	42.3
	2.0	+ 1.3	- 9.2	+ 8.0	+ 4.0	+ 5.6	+ 2.8	+ 9.6	- 5.9	+ 10.1	- 8.2	42.9
	1.2	+ 7.3	- 1.7	+ 10.5	+ 1.5	+ 4.1	+ 7.0	+ 9.6	- 8.3	+ 9.5	- 5.2	42.4
	2.4	+ 5.8	+ 5.4	+ 11.1	+ 4.6	+ 4.7	+ 6.2	+ 6.9	- 10.1	+ 6.8	- 5.4	42.8
	1.1	+ 2.5	+ 4.5	+ 0.9	+ 4.4	+ 0.6	+ 5.5	- 1.4	- 10.2	+ 7.8	- 1.4	41.5
	1.1	+ 0.5	+ 6.7	+ 3.5	+ 6.0	+ 0.8	+ 4.0	+ 2.5	- 17.8	+ 3.3	- 0.6	40.9
	1.3.0	- 2.3	+ 5.4	+ 5.2	+ 2.2	- 3.5	+ 0.8	+ 2.4	- 8.9	+ 7.8	+ 0.3	41.2
	1.10.0	- 0.6	+ 4.5	+ 2.2	+ 9.2	+ 7.1	- 1.1	- 4.5	+ 3.0	+ 8.7	+ 3.9	40.2
	1.5.9	- 0.5	+ 8.6	- 3.6	+ 5.4	+ 2.4	- 0.6	+ 9.5	+ 5.4	- 3.2	- 0.5	40.6
	1.8.7	- 1.8	+ 6.8	+ 0.3	+ 4.3	+ 0.8	- 2.9	+ 8.7	+ 1.3	+ 5.9	+ 6.5	40.7
	1.13.5	- 3.2	+ 5.2	- 0.8	+ 1.7	- 2.7	- 1.4	+ 3.5	+ 6.9	+ 10.1	+ 1.8	40.8
	1.16.8	- 5.3	+ 5.7	- 4.1	+ 1.4	- 6.8	- 3.5	+ 2.1	+ 10.0	+ 9.9	+ 0.4	41.1
	1.17.3	- 2.7	+ 6.1	- 2.7	+ 0.3	- 7.5	- 1.4	+ 4.7	+ 10.1	+ 7.0	+ 4.2	40.7
	1.19.0	- 7.3	+ 2.5	+ 4.7	+ 3.7	- 16.8	+ 1.2	+ 2.6	+ 8.4	+ 6.6	+ 2.2	40.3
	1.19.7	- 12.5	+ 2.9	+ 1.6	- 2.4	- 12.4	0.0	+ 8.4	- 4.0	+ 10.1	+ 11.0	39.9
	1.19.2	- 10.5	- 1.0	+ 5.0	+ 3.5	- 5.7	+ 3.0	+ 2.1	- 5.6	+ 0.4	+ 6.0	39.5
	1.13.6	- 10.1	+ 0.1	- 0.5	+ 0.5	+ 2.7	+ 7.5	- 6.8	- 9.6	+ 3.2	+ 2.0	39.0
	1.0.5	- 8.2	- 0.4	- 1.8	+ 2.2	+ 1.0	+ 8.4	- 4.1	+ 1.4	+ 10.1	- 2.2	39.3
	1.4.5	- 10.3	+ 0.6	- 1.9	- 4.4	- 6.0	+ 1.5	- 1.1	+ 1.4	+ 8.1	- 1.6	39.4
	1.3.0	- 15.6	+ 2.0	+ 2.0	- 1.5	- 8.1	+ 2.1	+ 3.3	- 5.0	+ 2.8	+ 2.1	38.5
	1.1.6	- 15.6	- 0.5	+ 6.5	+ 5.5	- 6.3	- 5.0	+ 2.7	+ 0.5	+ 6.0	- 3.1	38.5
	1.2.8	- 18.1	- 4.3	+ 9.1	+ 4.1	- 4.4	+ 3.1	+ 1.6	- 1.4	+ 3.8	- 4.9	36.8
	1.2.7	- 12.5	- 8.9	+ 9.9	+ 7.9	- 3.6	+ 7.7	+ 7.4	- 6.7	+ 7.7	- 11.4	37.5
	1.1.8	- 7.0	- 4.6	+ 6.4	+ 1.4	- 4.8	+ 0.7	+ 7.4	- 4.1	+ 11.5	- 10.0	37.0
	1.7.2	- 15.1	- 0.4	+ 13.4	- 1.1	+ 2.5	+ 7.8	+ 11.2	- 5.0	+ 6.1	- 13.0	36.5
	1.10.0	- 13.9	- 10.2	+ 7.7	+ 6.7	+ 1.7	+ 9.0	+ 10.2	- 3.1	- 1.3	- 5.4	38.2
	1.10.2	- 1.4	- 8.9	+ 5.8	- 1.2	- 2.3	+ 3.5	- 1.2	- 6.4	- 2.1	- 0.6	39.1
	1.13.4	- 1.1	- 3.3	+ 3.3	- 3.7	- 4.8	+ 7.8	- 10.1	- 11.4	- 1.4	+ 3.0	38.6
ME	4.3	- 4.6	- 0.5	+ 3.5	+ 2.3	- 2.0	+ 2.5	+ 3.0	- 3.2	+ 5.7	- 2.4	

IN the preceding Tables I. to XII., the mean temperature of the air is shown for every day in 44 years, and in the forty-sixth column of these Tables the mean temperature of every day is determined. By taking the differences between the mean temperature of every day, from the average of the same day as found from all the years, the excess or deficiency of every day is shown; and in this way Tables XVI. to XXVII. were formed, those days of excess of temperature being distinguished by the sign *plus* (+), and those of defect of temperature being denoted by the sign *minus* (—).

A glance at these Tables shows that the differences from day to day are very great, and that the temperature of the same day is very different in different years. At times it will be seen there have been long periods together with one or other sign prevailing, but that there have been but few months in which on every day of the month it has been either always above or below the average; the only instances are February 1853, July 1857, and August 1860, during which months every day was cold and of lower temperature than the average; and October 1831, in which every day was warm and of higher temperature than the average. There are, however, a few having but one with either a + or — sign and all the remainder affected with the opposite sign; they are:—

January,	1830 and 1834
February,	1855
April,	1844
June,	1860
November,	1851
December,	1852

every other month there have been two or more days with different signs. It will thus be seen how very rarely every day of a month has been wholly of high or wholly of low temperature. This will be more fully shown by the following Table:—

TABLE XXVIII.

Showing the Greatest Daily Excess and Deficiency in each Month of the Years 1826-69.

YEAR	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
1826	5.4	18.2	10.8	3.4	14.7	7.0	10.4	11.1	7.6	10.1	13.1	6.5	11.3	7.1	9.6	3.8	9.1	6.6	11.7	11.3	5.0	9.9	10.9	6.1
1827	13.9	13.8	8.2	14.4	10.4	6.5	15.0	10.5	12.4	8.8	5.8	7.4	12.1	1.1	8.1	4.9	7.2	4.7	9.1	8.1	10.9	14.6	13.7	5.9
1828	16.0	6.4	13.4	7.8	12.6	7.2	16.1	7.6	7.0	2.8	8.8	5.6	10.9	7.6	6.0	8.8	11.1	7.0	6.0	7.2	13.3	13.2	13.3	4.1
1829	5.6	15.9	7.2	12.7	8.6	9.0	5.3	11.3	6.5	6.3	9.7	10.3	4.6	8.2	5.2	10.8	3.3	9.8	8.2	14.5	12.8	12.6	3.0	13.9
1830	2.4	15.8	11.9	20.6	12.0	2.5	12.1	12.1	13.5	5.2	6.5	9.4	15.0	7.1	5.5	9.0	3.4	8.1	10.6	7.7	9.9	8.9	5.1	19.6
1831	9.5	12.5	16.9	6.6	1.9	4.9	11.6	3.3	7.3	12.8	4.8	6.3	9.6	4.1	8.2	1.6	9.7	8.0	11.9	...	11.9	10.1	12.0	7.4
1832	10.4	10.6	10.2	9.5	7.8	7.6	10.0	6.3	9.7	9.6	5.6	6.2	5.2	7.5	8.8	6.1	8.8	8.8	10.3	7.2	10.1	6.4	9.9	5.5
1833	7.8	11.5	13.2	4.0	7.0	10.8	5.8	7.6	16.9	3.4	9.3	8.0	7.4	8.9	5.5	10.8	3.3	8.5	11.0	6.5	9.2	8.5	12.6	4.1
1834	15.8	6.3	9.6	9.1	12.1	6.2	8.7	7.2	16.2	6.3	13.1	6.9	12.6	4.1	7.8	6.4	9.9	3.8	8.2	8.3	12.9	7.4	12.5	6.1
1835	12.7	13.3	9.8	5.7	7.0	6.1	13.7	10.8	7.1	7.1	10.9	13.5	8.6	5.1	10.5	4.0	8.1	5.0	7.2	10.1	12.9	8.1	8.1	15.0
1836	11.3	12.8	9.5	8.9	11.9	5.0	3.5	10.7	4.7	6.3	11.5	3.0	14.3	12.1	4.7	6.4	9.7	11.1	9.0	14.2	12.4	10.4	11.7	9.6
1837	10.7	11.3	10.3	6.9	2.4	11.4	2.3	13.0	3.6	13.7	5.9	9.2	9.7	7.3	10.1	8.3	10.2	8.1	9.1	7.2	10.6	15.0	11.0	12.1
1838	8.4	29.6	4.8	13.1	9.5	9.8	10.3	11.9	8.4	11.6	5.8	8.7	7.9	9.4	7.8	6.3	5.2	8.7	9.5	15.7	9.5	9.3	9.1	10.2
1839	10.4	12.8	11.8	9.7	8.0	11.5	6.2	13.6	9.1	12.9	8.6	11.1	4.8	6.0	7.2	9.4	8.4	4.4	9.6	7.4	11.6	10.7	13.3	8.6
1840	12.8	12.7	7.8	10.5	5.0	8.1	12.0	6.0	8.4	9.2	8.9	7.8	1.6	11.1	8.9	6.6	9.1	9.5	1.9	12.0	15.2	14.0	7.2	18.1
1841	10.9	22.1	8.7	16.9	11.0	4.7	14.6	9.5	13.8	5.9	6.2	11.8	3.5	9.2	8.9	9.8	11.8	12.0	7.2	10.3	12.4	12.4	9.1	13.4
1842	2.3	8.3	11.5	7.6	10.3	5.4	12.9	8.4	7.3	6.8	10.9	9.5	4.7	8.4	8.9	8.9	8.9	11.8	12.0	7.2	10.3	12.4	12.4	9.1

1843	130	55	94	130	110	87	81	92	02	100	113	142	73	121	60	26	78	78	66	57	93	121	83	69	206
1844	135	76	48	109	87	81	92	87	71	51	107	92	81	77	86	29	95	23	116	63	82	113	124	94	101
1845	115	85	33	223	89	223	87	86	84	83	53	149	32	135	29	110	49	87	48	66	81	116	130	63	180
1846	145	68	135	71	110	91	86	84	84	83	53	149	32	135	29	110	49	87	48	66	81	116	130	63	180
1847	62	97	118	181	71	147	70	108	176	67	63	87	118	51	80	78	64	105	95	72	127	100	129	59	59
1848	115	167	121	68	108	39	123	79	123	34	66	72	88	80	35	80	91	103	97	116	115	134	121	112	112
1849	135	117	84	54	76	67	47	133	111	86	117	102	65	55	81	73	74	74	103	116	119	144	112	128	128
1850	45	97	130	47	67	122	77	51	32	123	83	152	92	80	37	109	47	97	32	106	102	92	119	82	82
1851	149	76	65	118	67	56	62	94	53	108	106	92	70	66	82	75	68	66	106	70	05	115	108	78	78
1852	148	73	126	87	96	93	65	90	70	98	84	97	152	12	62	68	54	94	70	135	159	59	134	41	41
1853	125	40	...	131	81	140	78	121	62	145	70	93	86	91	56	57	53	75	116	131	81	133	28	157	157
1854	117	133	123	105	139	72	141	85	42	79	101	80	119	107	81	108	76	52	80	76	31	112	116	92	92
1855	118	152	24	224	48	108	89	104	143	139	114	145	67	71	70	43	83	91	55	60	77	107	114	196	196
1856	104	103	129	60	36	87	77	88	49	119	102	92	92	162	102	55	35	76	68	82	111	152	139	156	156
1857	96	154	66	130	98	83	95	101	93	81	125	91	79	76	122	45	71	68	69	53	111	35	131	51	51
1858	98	105	47	107	100	109	120	76	115	78	167	48	96	77	74	68	79	33	68	109	80	215	93	97	97
1859	118	41	115	76	142	104	149	110	68	56	71	38	119	37	103	81	87	63	98	186	73	180	134	197	197
1860	135	60	42	130	80	91	46	114	57	84	13	97	...	125	...	125	...	121	89	125	40	94	73	181	181
1861	85	213	74	74	72	53	37	168	93	138	94	72	36	62	111	48	79	66	102	17	121	177	86	118	118
1862	132	118	137	139	123	126	104	152	126	42	51	90	15	91	37	82	65	104	88	93	48	151	134	41	41
1863	109	05	91	65	107	52	85	86	72	92	55	57	60	76	58	58	84	45	85	70	46	115	78	92	44
1864	104	190	92	150	77	75	87	94	106	100	52	81	90	99	91	113	86	98	75	77	72	112	71	168	168
1865	101	125	59	157	39	132	148	96	128	51	95	83	74	59	52	18	70	82	100	85	90	85	90	50	50
1866	124	55	122	95	123	100	149	96	36	136	97	83	93	81	58	76	52	77	76	106	93	90	112	101	101
1867	136	261	118	64	86	120	97	30	148	165	103	73	53	105	139	121	91	71	92	122	99	128	101	178	178
1868	113	80	102	41	105	50	69	100	161	57	84	26	154	46	105	47	115	15	51	114	53	117	113	32	32
1869	142	97	120	58	42	88	153	71	49	135	123	272	124	77	95	68	96	68	90	121	116	86	110	130	130

On looking over this Table the first thing that strikes one is that the largest numbers are those generally under the — sign, and particularly so in the months of winter. There are but four blanks in the Table, *viz.*, February 1853, July and August 1860, and October 1831, showing, as before, that these are the only four months of one temperature throughout, three being cold and one warm.

By picking out under each month the largest number with a + sign and the largest number with a — sign, the extreme departures in each month in 44 years will be shown, and are as follows:—

In January the greatest excess on any one day was 16°0 in the year 1828			
„ February	„	16·9	1831
„ March	„	14·7	1826
„ April	„	16·1	1828
„ May	„	17·6	1847
„ June	„	16·7	1858
„ July	„	15·4	1868
„ August	„	14·5	1842
„ September	„	12·1	1865
„ October	„	11·9	1831
„ November	„	15·9	1852
„ December	„	13·9	1856

And

In January the greatest deficiency on any one day was 29°6 in the year 1838			
„ February	„	22·4	1855
„ March	„	22·3	1845
„ April	„	16·8	1861
„ May	„	16·5	1867
„ June	„	27·2	1869
„ July	„	16·2	1856
„ August	„	12·1	1867
„ September	„	12·1	1860
„ October	„	18·6	1859
„ November	„	21·5	1858
„ December	„	20·5	1844

In every month, with the exception of May and August, the extreme deficiency of temperature is larger than the extreme excess, and very largely so in many months.

The greatest excess of temperature during the 44 years was 17°·6; this took place on May 28, 1847; and the greatest deficiency was 29°·6, on January 20, 1838.

These extremes of temperature affect vegetation greatly, but they seldom occur alone; it is very necessary for the operations of open-air horticulturists to know for what lengthened periods these departures from averages may extend. By looking over Tables XVI. to XXVII., it

will be seen that very often there are long groups of + or — quantities, and that frequently several of the numbers are very large to which these signs are attached; and it is the accumulation of these departures, more than in isolated cases, which requires the attention of the horticulturist. These periods are variable in length, frequently of a week's duration, and less frequently of a fortnight; taking the latter as a limit, the following numbers show all the periods of excess of 14 days' or more than 14 days' continuance.

By taking the periods of excess above the average in each month, in which the number of days extend to 14 or more, and entering them opposite the month in which the period commences, we have the following:—

1828	January	17 to February	8	equal	23 days
1835	"	23 " "	8	"	17 "
1840	"	14 " January	29	"	16 "
1846	"	13 " February	7	"	26 "
1849	"	13 " January	28	"	16 "
1863	"	18 " February	8	"	22 "
1866	"	26 " "	12	"	18 "
1869	"	28 " "	21	"	25 "
1828	February	19 " March	4	"	15 "
1831	"	24 " "	13	"	18 "
1834	"	18 " "	12	"	23 "
1835	"	11 " February	27	"	17 "
1837	"	8 " "	23	"	16 "
1846	"	16 " March	11	"	24 "
1848	"	3 " February	16	"	14 "
1859	"	9 " "	22	"	14 "
1863	"	19 " March	8	"	18 "
1867	"	1 " February	26	"	26 "
1868	"	17 " March	7	"	19 "
1828	March	8 " "	21	"	14 "
1830	"	8 " "	31	"	24 "
1841	"	5 " April	1	"	28 "
1842	"	7 " March	20	"	14 "
1843	"	11 " "	26	"	16 "
1848	"	22 " April	5	"	15 "
1850	"	30 " "	19	"	22 "
1857	"	26 " "	10	"	16 "
1862	"	24 " "	7	"	15 "
1826	April	2 " "	23	"	22 "
1827	"	2 " "	17	"	16 "
1830	"	20 " May	8	"	19 "
1831	"	19 " "	4	"	16 "
1834	"	27 " "	16	"	20 "
1840	"	20 " "	16	"	27 "

1844	April	8 to May	14	equal	37 days
1863	"	8 " April	28	"	21 "
1867	"	1 " "	20	"	20 "
1868	"	15 " May	4	"	20 "
1828	May	6 " "	19	"	14 "
1833	"	1 " "	25	"	25 "
1841	"	21 " June	5	"	16 "
1846	"	29 " "	22	"	25 "
1848	"	3 " May	18	"	16 "
1858	"	29 " June	17	"	20 "
1859	"	24 " "	13	"	21 "
1868	"	8 " May	22	"	15 "
1826	June	6 " June	20	"	15 "
1826	"	23 " July	15	"	23 "
1828	"	22 " "	11	"	20 "
1831	"	9 " June	23	"	15 "
1836	"	26 " July	13	"	18 "
1837	"	12 " June	25	"	14 "
1842	"	3 " "	17	"	15 "
1859	"	30 " July	23	"	24 "
1827	July	6 " "	20	"	15 "
1831	"	26 " August	17	"	23 "
1834	"	28 " "	21	"	25 "
1835	"	15 " July	30	"	16 "
1852	"	3 " "	29	"	27 "
1856	"	28 " August	16	"	20 "
1868	"	6 " July	28	"	23 "
1826	August	14 " September	6	"	24 "
1837	"	9 " August	23	"	15 "
1842	"	12 " "	30	"	19 "
1831	September	23 " November	2	"	41 "
1843	"	6 " September	24	"	19 "
1846	"	4 " "	18	"	15 "
1859	"	30 " October	20	"	21 "
1861	"	28 " "	15	"	18 "
1865	"	2 " September	21	"	20 "
1868	"	1 " "	15	"	15 "
1826	October	18 " October	31	"	14 "
1849	"	17 " "	30	"	14 "
1852	"	30 " November	22	"	24 "
1853	"	21 " "	8	"	19 "
1856	"	2 " October	18	"	17 "
1863	"	10 " "	23	"	14 "
1827	November	3 " November	20	"	18 "
1828	"	14 " "	30	"	17 "

1831	November	30 to December	20	equal	21 days
1832	"	14 " November	28	"	15 "
1839	"	3 " "	20	"	18 "
1846	"	10 " "	26	"	17 "
1863	"	14 " "	28	"	15 "
1826	December	7 " December	21	"	15 "
1827	"	14 " "	27	"	14 "
1828	"	10 " "	25	"	16 "
1833	"	14 " 1834 Jan.	28	"	46 "
1837	"	17 " 1838 Jan.	4	"	19 "
1843	"	14 " December	31	"	18 "
1848	"	3 " "	16	"	14 "
1852	"	2 " 1853 Jan.	16	"	46 "
1863	"	2 " December	21	"	20 "
1868	"	1 " "	28	"	28 "

During the 44 years, there were periods of excess of temperature, of a fortnight or more in duration, beginning :—

In January	in 8 years	In July	in 7 years
" February	" 11 "	" August	" 3 "
" March	" 9 "	" September	" 7 "
" April	" 10 "	" October	" 6 "
" May	" 8 "	" November	" 7 "
" June	" 8 "	" December	" 10 "

or 94 instances in all.

By taking the periods of defect below the average in each month in which the number of days extend to 14 or more, and entering them opposite the month in which the period commences, we have the following :—

1829	January	5 to January	25	equal	21 days
1830	"	8 " February	6	"	30 "
1838	"	5 " January	28	"	24 "
1842	"	17 " "	30	"	14 "
1844	"	31 " February	14	"	15 "
1845	"	28 " "	24	"	28 "
1847	"	9 " January	23	"	15 "
1850	"	5 " "	18	"	14 "
1853	"	31 " March	4	"	33 "
1855	"	13 " February	24	"	43 "
1857	"	22 " "	5	"	15 "
1865	"	16 " January	31	"	16 "
1827	February	2 " February	25	"	24 "
1838	"	10 " "	24	"	15 "
1840	"	18 " March	9	"	20 "
1845	"	28 " "	21	"	22 "
1858	"	14 " "	12	"	27 "
1866	"	26 " "	15	"	18 "
1867	"	27 " "	22	"	24 "

1837	March	11 to April	24	equal	45 days
1850	"	14 " March	29	"	16 "
1853	"	14 " "	30	"	17 "
1865	"	3 " "	31	"	29 "
1869	"	20 " April	4	"	16 "
1826	April	24 " May	9	"	16 "
1838	"	16 " April	30	"	15 "
1842	"	1 " "	19	"	19 "
1849	"	10 " "	24	"	15 "
1854	"	22 " May	6	"	15 "
1855	"	25 " "	9	"	15 "
1857	"	22 " "	10	"	19 "
1860	"	9 " April	28	"	20 "

There are no instances in May in which the periods extend to 14 days, but there are several periods of 13 days.

1860	May	26 to June	23	equal	29 days
1830	June	7 " "	23	"	17 "
1847	"	13 " "	26	"	14 "
1854	"	2 " "	21	"	20 "
1856	"	11 " "	24	"	14 "
1860	"	25 " September	7	"	75 "
1862	"	8 " July	7	"	30 "
1869	"	9 " June	26	"	18 "
1840	July	2 " July	27	"	26 "
1848	"	31 " August	25	"	26 "
1849	"	17 " "	1	"	16 "
1850	"	1 " July	14	"	14 "
1853	"	10 " "	26	"	17 "
1862	"	9 " "	25	"	17 "
1863	"	16 " August	1	"	17 "
1867	"	22 " "	7	"	17 "
1828	August	9 " "	23	"	15 "
1829	"	24 " September	8	"	16 "
1845	"	6 " August	24	"	19 "
1853	"	3 " "	18	"	16 "
1866	"	3 " "	18	"	16 "
1829	September	11 " October	2	"	22 "
1836	"	5 " September	22	"	18 "
1840	"	11 " "	26	"	16 "
1840	"	28 " October	15	"	18 "
1850	"	28 " "	17	"	20 "
1852	"	29 " "	14	"	16 "
1863	"	4 " September	17	"	14 "
1842	October	18 " November	8	"	22 "
1869	"	16 " October	31	"	16 "
1835	November	1 " November	16	"	16 "
1844	"	21 " December	17	"	27 "
1846	"	27 " "	18	"	22 "
1851	"	11 " "	4	"	24 "

1853	November 14 to November 28	equal	15 days
1855	" 29 " December 14	"	16 "
1856	" 3 " November 17	"	15 "
1858	" 6 " " 24	"	19 "
1859	" 8 " " 22	"	15 "
1862	" 11 " " 27	"	17 "
1829	December 13 " 1830 Jan. 6	"	25 "
1835	" 4 " December 17	"	14 "
1837	" 1 " " 16	"	16 "
1840	" 3 " " 30	"	28 "
1841	" 30 " 1842 Jan. 15	"	17 "
1853	" 14 " 1854 Jan. 6	"	24 "
1859	" 10 " December 23	"	14 "
1860	" 10 " 1861 Jan. 19	"	41 "

During the 44 years there were periods of deficiency of temperature of a fortnight or more in duration, beginning

In January there are 12 times				In July there are 8 times			
" February	"	7	"	" August	"	5	"
" March	"	5	"	" September	"	7	"
" April	"	8	"	" October	"	2	"
" May	"	1	"	" November	"	10	"
" June	"	7	"	" December	"	8	"

Or 80 instances in all, being 14 less in number than in similar periods of excess of temperature.

From the above groups we find that the largest periods of excess and deficiency above or below the average in each month are as follows:—

In January, of excess 26 days in 1846; and of deficiency 43 days in 1855

" February	"	26	"	1867	"	27	"	1858
" March	"	28	"	1841	"	45	"	1837
" April	"	37	"	1844	"	20	"	1860
" May	"	25	"	1833 and 46	"	29	"	1860
" June	"	24	"	1859	"	75	"	1860
" July	"	27	"	1852	"	31	"	1860
" August	"	24	"	1826	"	31	"	1860
" September	"	41	"	1831	"	22	"	1829
" October	"	24	"	1852	"	22	"	1842
" November	"	21	"	1831	"	27	"	1844
" December	"	46	"	1833 and 52	"	41	"	1860

Thus the longest period of excess above the average is 46 days, both beginning in December, in 1833 and 1852; and the longest period of deficiency below the average is 75 days, beginning in June 1860.

By taking the algebraical means of the values in each column of Tables XVI. to XXVII., the following Table was formed.

By looking over this Table at the general distribution of the + and - signs, the most remarkable fact is the preponderance of + signs in the month of January, towards the end of the series, over those at the

TABLE XXIX.

Showing the Departure above or below the Average of the Temperature of each Month.

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1826	-5.0	+4.4	+1.0	+2.5	-1.5	+3.5	+3.5	+3.8	+1.3	+2.6	-1.4	+3.8
1827	-1.7	-5.5	+3.0	+1.9	+1.9	-0.1	+3.4	+0.1	+1.9	+2.5	+1.2	+4.7
1828	+4.3	+2.6	+3.0	+1.6	+2.9	+2.2	+0.2	-0.9	+2.6	+0.7	+2.7	+5.3
1829	-4.4	+0.4	-1.5	-2.3	+1.4	-0.2	-2.1	-2.4	-2.5	-1.9	-2.1	-6.4
1830	-5.2	-2.6	+6.1	+2.8	+2.5	-2.7	+1.6	-1.9	-2.0	+1.4	+2.7	-4.1
1831	-1.8	+3.5	+4.4	+3.4	+0.1	+0.9	+1.8	+3.3	+1.0	+6.5	+0.7	+2.6
1832	-0.5	-1.2	+0.3	+0.8	-1.2	+0.5	-0.6	+0.5	+0.1	+1.0	+1.6	+1.8
1833	-2.5	+4.3	-3.5	-1.0	+6.6	+0.6	-0.9	-2.3	-2.4	+0.9	+0.9	+5.7
1834	+8.2	+1.8	+3.0	-0.6	+3.4	+1.4	+2.5	+1.4	+2.2	+1.2	+2.0	+0.9
1835	+1.3	+3.6	+0.4	+0.8	-0.3	+0.7	+2.0	+3.0	+1.6	-1.4	+1.9	-5.0
1836	-0.6	-1.5	+2.4	-2.6	-1.4	+2.1	+1.1	-0.7	-2.7	-2.0	-0.1	+0.3
1837	+0.9	+1.6	-4.8	-6.1	-4.9	+0.3	+0.9	+0.6	-0.7	+0.5	-2.2	+1.1
1838	-8.6	-5.7	-0.1	-3.9	-1.1	-1.2	-0.9	-0.4	-1.4	+0.7	-1.0	-1.2
1839	+0.3	+0.8	-0.8	-3.5	-1.2	+0.5	-0.6	-0.5	+0.2	+0.2	+3.5	+0.2
1840	+2.2	-0.3	-3.0	+2.6	+2.2	+0.9	-2.8	+1.6	-3.6	-4.5	+0.5	-7.5
1841	-2.9	-2.4	+4.5	0.0	+4.5	-3.1	-3.4	-0.4	+1.7	-0.2	+0.4	+0.3
1842	-4.1	+1.8	+3.5	-0.6	+0.6	+3.1	-2.8	+5.0	+0.5	-4.1	+0.6	+4.6
1843	+2.7	-2.9	+1.4	+1.0	-1.3	-3.2	-1.1	+1.3	+4.2	-1.8	+0.6	+3.9
1844	+1.3	-3.6	+0.1	+4.4	-0.7	+1.2	+0.1	-2.8	+0.9	-0.7	+0.7	-6.4

1845	+1.5	-6.3	-5.5	-0.1	-4.2	-0.2	-2.1	-3.6	-3.0	-1.2	+1.8	+0.5
1846	+5.7	+4.1	+1.7	-0.4	+2.3	+6.3	+2.7	+1.9	+3.5	-0.3	+2.0	-7.6
1847	-2.6	-3.6	-1.0	-2.9	+2.9	-2.2	+2.5	+0.4	-3.3	+2.0	+3.5	+2.1
1848	-3.0	+4.4	+1.4	+0.1	+4.6	-1.1	-0.7	-3.2	-0.8	-0.2	-1.1	+2.4
1849	+2.5	+2.5	+0.7	-3.3	+1.3	-0.2	-0.8	+1.1	+0.9	-0.3	+0.2	-2.0
1850	-4.0	+4.2	-2.7	+1.5	-2.5	+0.5	-0.7	-1.9	-1.9	-5.0	+2.0	-0.8
1851	+4.7	+0.3	+0.7	-1.7	-1.9	-0.1	-1.4	+1.4	-0.8	+2.0	-5.6	+0.1
1852	+3.0	+0.7	-1.4	-1.4	-1.7	-2.2	+5.0	+0.9	-0.3	-3.4	+5.8	+7.2
1853	+4.8	-6.3	-3.8	-1.1	-1.9	-1.1	-1.5	-1.6	-1.4	+0.5	-1.7	-6.2
1854	+1.3	-0.4	+1.6	+1.6	-2.6	-2.9	-1.0	-1.0	+0.3	-1.4	-3.1	-0.1
1855	-3.2	-10.6	-4.0	-1.2	-4.6	-2.2	-0.1	+0.8	-0.7	+0.1	-1.8	-4.4
1856	+1.4	+2.4	-2.9	-0.5	-3.8	-0.7	-1.0	+1.6	-2.3	+0.9	-2.6	-0.5
1857	-1.5	-1.6	+0.1	-1.4	+0.5	+1.9	+1.2	+3.0	+1.8	+2.0	+3.1	+4.2
1858	-1.3	-4.5	0.0	+0.2	-1.3	+5.3	-1.6	-0.1	+2.9	-0.5	-5.0	0.0
1859	+2.4	+2.4	+4.0	-0.6	-0.6	+2.4	+5.0	+0.9	-0.8	-0.3	-2.4	-4.3
1860	+1.6	-4.2	-0.6	-4.4	-0.2	-5.2	-4.5	-4.0	-4.3	-0.4	-3.0	-4.6
1861	-4.8	+2.1	+1.4	-3.5	-1.8	-0.1	-1.4	+1.0	-0.6	+4.3	-3.6	-0.5
1862	+1.1	+2.1	+1.5	+1.1	+2.4	-3.1	-4.0	-2.1	+0.3	+1.5	-2.8	+3.5
1863	+4.2	+2.9	+2.3	+2.1	-1.5	-0.6	-1.0	+0.5	-3.1	+1.7	+2.1	+2.3
1864	-2.7	-3.7	-1.0	+1.3	+0.4	-2.1	-1.3	-2.3	-0.5	+0.2	-1.1	-2.0
1865	-1.3	-2.7	-5.6	+4.6	+2.2	-0.3	+0.8	-2.4	+5.1	-0.1	+1.4	+2.5
1866	+5.3	+1.2	-1.3	+1.3	-3.3	+1.8	-1.3	-1.9	-0.9	+0.6	+2.0	+3.0
1867	-4.2	+5.5	-8.8	+3.3	+0.3	-0.4	-2.6	+0.3	+0.9	-1.7	-2.3	-3.2
1868	+0.1	+4.0	+3.0	+1.4	+4.1	+3.1	+5.6	+2.6	+3.3	-2.6	-1.4	+5.7
1869	+3.2	+5.8	-4.3	+3.2	-2.9	-3.9	+2.3	-0.9	+2.2	-0.9	+0.3	-2.4

NOTE.—The sign plus (+) signifies above the average, and the sign minus (—) below the average.

beginning of the series; it is a fact well worthy the thoughtful attention of all horticulturists; the same thing is also shown in February, but to a less degree. Then, on the contrary, in the months of May, June, and July, the + signs seem to be more frequent at the beginning of the series than towards the end; particularly this is shown in the month of July, implying that our winter months are somewhat warmer, and our summer months somewhat colder, than formerly.

It will be seen that the same months have frequently been either above or below the average for three or four years in succession.

By selecting under each month the largest number with the + sign and the largest number with the - sign, the warmest and coldest of the several months are shown, and are as follows:—

In January the greatest excess was $8^{\circ}2$ in 1834, and greatest deficiency was $8^{\circ}6$ in 1838			
„ February	„	5.8 „ 1869	„ „ 10.6 „ 1855
„ March	„	6.1 „ 1830	„ „ 5.6 „ 1865
„ April	„	4.6 „ 1865	„ „ 6.1 „ 1837
„ May	„	6.6 „ 1833	„ „ 4.9 „ 1837
„ June	„	6.3 „ 1846	„ „ 5.2 „ 1860
„ July	„	5.6 „ 1868	„ „ 4.5 „ 1860
„ August	„	5.0 „ 1842	„ „ 4.0 „ 1860
„ September	„	5.1 „ 1865	„ „ 4.3 „ 1860
„ October	„	6.5 „ 1831	„ „ 5.0 „ 1850
„ November	„	5.8 „ 1852	„ „ 5.6 „ 1851
„ December	„	7.2 „ 1852	„ „ 7.6 „ 1846

Therefore the largest monthly excess of temperature was $8^{\circ}2$ in January 1834, and the largest deficiency was $10^{\circ}6$ in February 1855.

By taking the means of the numbers in each horizontal line in Table XXIX., the departure from the average of each year's temperature will be shown, divided into two groups of warm and cold, and are as follows:—

Warm Years		Cold Years	
In 1826 too high by $1^{\circ}5$		In 1829 too low by $2^{\circ}0$	
„ 1827	1.1	„ 1836	0.5
„ 1828	2.3	„ 1837	1.1
„ 1830	0.1	„ 1838	2.1
„ 1831	2.2	„ 1840	1.0
„ 1832	0.2	„ 1841	0.1
„ 1833	0.5	„ 1844	0.4
„ 1834	2.3	„ 1845	1.8
„ 1835	0.7	„ 1847	0.2
„ 1842	0.7	„ 1850	0.9
„ 1843	0.4	„ 1851	0.2
„ 1846	1.8	„ 1853	1.8
„ 1848	0.2	„ 1854	0.6

Warm Years			Cold Years		
In 1849 too high by		0 ^o ·2	In 1855 too low by		2 ^o ·7
„ 1852	„	1·0	„ 1856	„	0·7
„ 1857	„	1·1	„ 1858	„	0·5
„ 1859	„	0·7	„ 1860	„	2·8
„ 1862	„	0·1	„ 1861	„	0·6
„ 1863	„	1·0	„ 1864	„	1·2
„ 1865	„	0·4	„ 1867	„	0·7
„ 1866	„	0·5			
„ 1868	„	2·4			
„ 1869	„	0·1			

The year 1839 was of the average temperature.

The warm years 1828, 1831, 1834, and 1868 were all 2^o $\frac{1}{4}$ above the average: the year of greatest excess was 1868.

The cold years 1829, 1838, 1855, and 1860 were from 2^o·0 to 2^o·8 below the average: the year of greatest deficiency was 1860.

Thus in 44 years, the temperature of 23 have been above; 20 below, and one of the average value.

It is remarkable that from 1826 to 1835, with the single exception of 1829, every year was above the average; and those from 1836 to 1841, with the exception of 1839, which was just the average, all were below; and since then the only group of four or five years together of the same character in this respect were those from 1850 to 1856 (with the exception of 1852), which were below their averages. Since the year 1856, warm and cold years have been almost alternate.

ON THE
DAILY RANGES OF TEMPERATURE
ON EVERY
DAY OF THE YEAR
FROM ALL
THE MAXIMUM AND MINIMUM READINGS
OF
THERMOMETERS
TAKEN AT THE
HORTICULTURAL GARDENS
AT
CHISWICK

FROM THE YEAR 1826 TO THE END OF 1869

DAILY RANGES OF TEMPERATURE.

It is found that animal life is best preserved when the temperature of each season is that of its average, and when the range of temperature is also that of the average, and that sickness and death follow any great departure from these averages.

The occasional destruction of shrubs and fruit-trees by the cold of winter is very distressing and very annoying, and this sometimes takes place when the mean temperature of the air is the same as the plant has previously endured without injury; but the mean temperature of a period does not represent the actual temperature to which the plant has been subjected. The mean temperature may be based upon a range of temperature corresponding to the average, or it may be from one much smaller or much larger than the average; and in the latter case the plant is subjected to the injurious effect of alternate very high and very low temperatures, and in winter time this would imply a period, and perhaps a long one, in which the temperature was below 32° Fahr.

It is very important that the agriculturist and out-door horticulturist should know the ranges of temperature to which plants are exposed in the open air. This variation of temperature differs day by day and month by month; and it is only after a long series of observations that we are able to determine the average daily range in every season. The readings of the maximum and minimum thermometers have been taken continuously at Chiswick since 1826, and the difference between these values gives the range of temperature on each day throughout the period comprised between the years 1826-1869. Collecting these month by month and arranging them in parallel columns for different years, we have at one opening the ranges of temperature on every day throughout that month for the whole forty-four years, and thus Tables XXX. to XLI. were formed.

Looking over the numbers in these Tables we see that in any month the range may be as small as 1° to 5° , and as large as from 30° to 40° in the winter months, and exceeding 40° by several degrees in the summer months. That frequently several days of small range come together, indicative of so many days of cloudy skies ; and several days of larger range come together, indicating periods of clear skies.

By looking at the numbers on the same horizontal line, or the daily ranges of temperature on the same day of the month in different years, similar large differences appear ; for instance on January 1 in the year 1837 the range was 23° , whilst in 1851 and 1859 on the same day of the year it was 3° only. Great varieties are thus shown on every day by comparing the results of different years together, or the numbers on the same horizontal line in the several Tables.

These results, being dependent on the different directions of the wind, the more or less cloudy state of the sky, and the different conditions of the weather generally, are as variable as the weather itself.

The maximum and minimum temperatures from which these results have been obtained are not given in these series of Tables, but they may be found approximately on any day by adding one-half of the range to the mean temperature of the same day, Table I. to XII., for the maximum, and by subtracting one-half of the range from the mean temperature for the day for the minimum.

By selecting the smallest and largest range in each month in all the years Table XLII. has been formed.

This Table shows very clearly how variable the range of temperature may be in twenty-four hours, and how very different in different years.

For instance, in the month of January under 'greatest' in the year 1833, the largest range in any one day was 15° , whilst in general it exceeds 20° , and in some years it has been as large as 30° . On the contrary, under 'least' in the years 1828 and 1854 the range has been as small as 1° , and by looking down the column it will be seen that ranges as small as 2° or 3° are common, whilst in other years there has been no range less than 8° or 9° . As small daily ranges have taken place in January and December, as 1° ; in February and November as 2° ; in March, April, and October as 3° , in June and September as 4° ; and in July and August as 5° . As large daily ranges as 32° have taken place in the months of January and December ; of 34° in November ; of 38° in February ; of 39° in March ; of 42° in June and October ; of 44° in May ; of 45° in July ; of 48° in April, and one of 49° in August 1861, which is the largest in the Table.

By taking the mean of all the daily ranges in each year, or the mean of the numbers in every vertical column in Tables XXX. to XLI. Table XLIII. is formed.

From these numbers we see that the mean monthly daily range o. temperature has varied

*from rural Society at
year*

DAY OF THE MONTH	U A						
	1847	1864	1865	1866	1867	1868	1869
1	6	17	18	20	20	6	15
2	8	20	21	10	20	4	7
3	5	18	17	11	26	9	16
4	5	10	21	7	18	9	15
5	13	23	15	11	26	3	18
6	8	11	8	20	19	10	17
7	5	20	19	15	9	10	9
8	5	19	9	9	16	5	8
9	14	15	12	16	12	4	12
10	9	20	11	17	7	5	6
11	13	20	10	9	14	6	4
12	9	8	14	15	20	11	4
13	17	5	18	22	32	15	7
14	16	3	12	12	26	10	10
15	15	8	15	15	16	15	20
16	9	7	18	8	13	11	15
17	3	11	12	12	14	13	12
18	4	12	16	8	14	10	9
19	7	7	14	12	19	11	12
20	11	7	14	13	7	14	19
21	6	13	13	9	5	14	8
22	6	17	22	10	12	13	14
23	10	24	13	13	28	7	8
24	9	22	16	20	11	14	10
25	14	17	8	11	13	17	14
26	10	20	7	11	10	18	12
27	9	16	6	12	9	16	11
28	22	16	24	11	10	19	13
29	23	23	21	12	10	16	14
30	17	24	12	15	18	17	15
31	20	17	17	11	13	11	6

rdens of the Royal Horticultural Society at

1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
16	12	20	21	10	12	14	10	13	11	21	14
5	15	9	23	9	7	7	20	18	13	12	23
21	15	18	15	14	27	14	18	17	21	18	9
15	14	15	8	10	16	12	9	16	19	17	17
22	16	18	6	15	12	5	7	8	17	11	22
22	18	22	12	11	9	8	11	9	20	20	19
18	20	18	17	10	16	16	12	15	9	8	6
20	12	21	11	17	19	13	16	17	18	14	8
11	11	16	8	10	17	16	15	13	13	20	10
8	15	22	23	17	11	22	11	11	10	16	13
4	9	24	20	14	23	14	15	11	18	17	17
11	10	16	15	17	32	16	13	9	13	20	15
5	18	14	16	6	23	15	6	22	9	23	16
7	20	15	20	10	29	17	7	22	20	5	6
10	12	15	14	15	25	11	32	11	19	15	5
22	18	10	20	12	30	22	21	15	19	23	9
21	20	10	22	10	38	10	12	24	13	24	14
14	20	13	25	14	27	17	16	21	6	7	16
17	16	22	15	11	7	12	18	22	9	7	22
15	16	17	10	13	14	8	14	19	17	15	16
17	25	12	11	29	20	8	9	20	20	13	13
17	26	24	16	16	15	21	13	26	7	19	4
10	23	25	8	12	17	19	11	26	26	18	11
19	27	26	9	6	13	12	14	10	19	11	19
17	27	25	10	9	13	9	24	13	12	24	15
12	20	18	26	2	8	6	12	16	12	10	11
15	13	18	25	5	16	6	16	12	12	10	20
15	23	21	15	10	32	20	16	12	15	13	9
		31				21				12	

Ad ftural Society at
e y

DAY OF THE MONTH	A E						
	1826	18864	1865	1866	1867	1868	1869
1	11	18 ⁰ 185	14	18	17	10	16
2	8	86	16	16	15	13	13
3	13	180	23	19	15	13	12
4	18	116	20	12	14	7	15
5	17	80	20	16	24	17	15
6	19	76	12	21	15	14	16
7	12	134	24	20	9	16	25
8	18	147	14	14	14	15	17
9	24	202	16	17	9	15	11
10	28	166	20	14	12	20	11
11	22	184	13	15	9	15	12
12	17	214	18	21	12	17	19
13	13	213	18	18	4	11	14
14	11	2613	12	27	7	10	8
15	16	2113	11	25	15	25	8
16	20	1725	21	16	18	15	12
17	19	3531	15	23	20	19	6
18	21	3426	10	18	5	16	21
19	16	2235	10	12	4	21	17
20	14	1610	15	14	16	10	7
21	13	3315	18	14	14	13	5
22	7	2413	20	18	13	8	17
23	16	1832	21	14	14	17	12
24	8	1930	28	11	16	14	11
25	16	2526	16	16	6	17	20
26	14	2817	17	10	17	17	21
27	1	2423	25	17	28	23	19
28	1	2220	16	16	17	14	7
29	14	2324	23	16	21	19	16
30	21	3025	25	18	19	30	19
31	21	2319	27	12	35	29	23

ardens of the Royal Horticultural Society at

1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
17 ^o	18 ^o	20 ^o	13 ^o	10 ^o	37 ^o	16 ^o	22 ^o	18 ^o	13 ^o	20 ^o	19 ^o
33	10	13	18	11	35	17	29	15	16	20	16
18	24	20	20	28	33	17	22	15	19	27	15
22	22	24	27	22	17	20	15	26	19	32	15
11	26	17	29	9	19	7	13	17	22	35	14
8	31	30	14	10	15	11	20	17	17	20	4
8	33	27	18	11	14	17	22	10	18	24	23
14	10	14	25	10	22	24	42	15	15	22	17
8	12	13	27	12	11	14	44	13	20	22	5
19	23	22	33	17	12	23	36	19	14	25	24
27	16	16	36	8	15	34	41	15	21	19	38
17	14	16	23	25	17	26	31	10	20	20	30
25	16	19	13	26	23	21	34	15	9	17	35
29	17	18	11	23	24	36	20	14	7	21	27
32	23	16	21	30	30	28	23	17	22	23	23
30	19	28	29	10	26	12	23	16	15	24	14
21	26	22	20	24	20	27	26	17	15	17	9
32	20	28	21	12	27	40	24	36	17	14	16
33	26	12	26	11	38	29	22	27	15	11	14
39	27	17	24	14	34	33	28	22	22	15	16
43	22	25	32	27	21	28	36	22	17	19	24
37	35	24	17	18	17	29	38	22	19	13	30
40	15	20	20	22	24	32	48	22	20	18	11
29	13	4	24	32	18	26	42	24	20	16	22
28	10	18	36	33	29	26	41	28	11	14	21
29	23	24	30	22	33	16	45	29	15	14	26
20	9	20	16	34	21	21	40	31	18	20	31
30	9	26	28	42	14	10	40	29	26	25	30
18	25	34	30	25	18	28	25	11	28	14	29
20	7	29	22	31	16	23	26	14	28	23	27

from Society at
the year

DAY OF THE MONTH	M A Y					
	1847	1865	1866	1867	1868	1869
1	14	23	10	19	17	19
2	29	31	20	25	24	29
3	13	23	20	25	38	16
4	22	18	33	22	27	15
5	32	24	21	28	24	20
6	22	431	19	32	19	13
7	15	420	28	31	33	24
8	12	424	22	31	40	16
9	21	432	30	28	18	11
10	18	410	26	32	22	21
11	25	416	24	21	18	14
12	20	325	26	11	24	22
13	27	428	21	7	27	23
14	19	310	21	12	24	16
15	16	418	20	13	29	19
16	19	325	23	13	16	9
17	24	227	23	22	27	26
18	25	439	34	24	32	11
19	17	234	31	22	33	9
20	25	227	25	19	29	22
21	24	123	20	17	25	22
22	27	232	23	15	16	25
23	30	332	36	19	14	24
24	27	324	23	17	15	17
25	24	341	22	25	21	18
26	39	330	31	28	23	24
27	34	323	41	24	31	16
28	32	426	28	23	33	5
29	32	221	33	30	26	17
30	33	319	27	20	23	25
31	34	225	17	30	25	20

ms of the Royal Horticultural Society at

1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
35	23	22	19	36	31	25	18	32	32	30	24
31	19	18	29	27	38	14	18	40	26	25	20
37	15	16	15	18	37	24	32	37	12	27	23
33	17	20	22	28	29	34	34	32	21	16	19
24	20	18	31	15	13	22	28	21	11	23	23
28	26	18	11	12	19	29	26	25	20	32	33
28	19	20	19	23	20	26	26	25	17	30	39
22	23	17	21	25	19	28	34	26	25	24	32
31	21	11	11	24	21	31	39	34	32	26	30
29	21	23	22	25	24	38	33	28	30	42	17
38	17	16	23	23	21	33	28	27	32	27	26
32	24	12	36	21	18	32	33	16	30	28	21
27	21	23	27	27	23	24	41	12	12	37	19
40	20	22	28	22	29	23	40	24	21	37	25
38	26	17	34	23	20	23	30	31	16	29	19
44	21	16	28	33	12	28	37	20	20	32	19
26	25	20	37	23	26	32	38	27	23	36	14
35	23	32	26	24	26	30	12	14	25	26	25
35	18	14	37	22	22	35	26	20	16	20	24
28	15	21	33	22	24	24	40	23	21	38	22
37	25	23	21	13	22	27	50	29	22	30	9
40	22	19	27	37	14	20	44	35	30	19	23
40	18	22	26	35	22	27	36	35	30	24	28
23	23	23	25	31	23	14	32	26	20	25	29
33	25	19	27	28	14	19	35	26	27	20	22
32	26	20	31	26	29	29	25	30	27	33	26
44	24	15	36	15	28	28	28	31	42	32	29
37	16	22	24	13	25	19	28	33	20	23	24
32	20	25	27	22	25	22	12	30	38	35	24
33	24	21	26	31	29	32	16	33	35	23	11

from al Society at
year

DAY OF THE MONTH	J L Y					
	1847	1865	1866	1867	1868	1869
1	19	24	27	39	21	14
2	13	32	25	16	25	16
3	20	40	20	19	21	18
4	40	30	22	20	18	29
5	34	23	27	17	33	31
6	29	25	33	28	23	20
7	23	19	30	34	28	15
8	29	24	13	35	32	17
9	20	26	25	33	30	27
10	18	22	35	38	30	27
11	27	23	29	20	28	37
12	35	30	34	20	23	34
13	31	19	25	20	32	21
14	34	27	35	23	29	27
15	30	36	30	11	32	31
16	24	26	26	13	30	26
17	14	31	22	14	27	35
18	22	21	34	18	24	34
19	18	22	28	13	26	20
20	18	24	33	18	32	25
21	21	22	32	21	30	26
22	28	25	29	21	36	33
23	30	29	26	19	23	25
24	23	26	17	18	24	35
25	21	35	13	23	22	26
26	30	37	25	11	24	23
27	31	37	16	23	30	25
28	20	39	19	31	25	12
29	34	32	21	20	14	25
30	32	36	23	28	24	12
31	36	21	18	29	28	17

dens of the Royal Horticultural Society at

1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
34	34	20	35	37	27	27	23	22	17	27	19
30	29	19	31	33	29	30	26	21	12	26	22
31	20	22	12	41	28	34	28	29	25	23	16
23	35	24	32	21	25	37	35	26	31	26	19
35	37	19	39	17	20	34	30	31	23	31	20
44	13	21	35	21	16	39	36	15	16	12	18
42	16	28	21	18	19	33	30	25	17	26	24
41	22	12	15	8	20	24	36	25	18	30	9
27	15	17	14	17	34	16	36	32	14	26	21
29	17	17	25	16	22	30	22	29	25	29	22
35	25	27	28	31	29	28	35	23	26	21	22
38	30	16	28	19	33	43	19	15	29	22	29
35	22	18	38	14	29	40	23	19	32	17	24
24	21	25	20	25	18	31	24	16	30	19	19
22	19	16	22	26	27	36	16	22	30	22	27
38	26	15	24	16	21	31	22	20	21	10	22
27	17	22	31	11	24	34	21	29	16	9	22
28	22	13	23	33	19	42	22	39	20	12	26
23	32	11	30	33	20	36	28	25	22	10	19
25	35	18	38	22	17	28	25	22	30	13	24
12	40	19	34	25	24	33	25	24	29	19	34
19	37	15	16	27	26	24	33	24	25	14	28
34	36	21	31	37	18	21	10	21	26	24	23
22	37	7	26	37	21	22	18	16	19	25	30
31	37	11	23	31	22	28	31	24	18	24	26
25	18	20	38	33	10	38	35	23	21	19	30
19	28	24	43	37	21	34	41	22	19	23	34
26	27	19	38	38	33	18	22	23	19	19	36
20	27	19	28	32	26	27	28	8	20	21	14
30	20	19	36	29	22	30	34	19	24	21	26
25	23	20	49	25	21	19	30	33	20	21	29

the observations Society at
26-1869.

DAY THE MONTH	R.							
	1849	1850	1851	1852	1866	1867	1868	1869
1	11 ⁰	26 ⁰	18 ⁰	30 ⁰	21 ⁰	21 ⁰	27 ⁰	32 ⁰
2	25	21	14	31	22	19	34	27
3	17	13	16	27	17	21	35	25
4	18	36	18	24	12	20	38	31
5	25	29	18	21	16	31	35	21
6	29	34	14	18	14	17	37	13
7	22	34	18	14	12	22	42	16
8	24	24	20	18	13	27	13	16
9	21	14	26	10	15	24	30	18
10	19	30	37	10	19	32	25	23
11	26	32	32	22	17	16	30	19
12	17	38	36	26	13	20	19	14
13	16	36	39	21	16	28	28	15
14	11	19	33	17	18	26	14	12
15	24	13	28	18	22	30	14	14
16	18	16	14	17	20	30	19	11
17	19	30	24	25	22	15	14	8
18	19	23	19	13	23	19	20	16
19	24	17	21	10	23	19	11	20
20	13	13	25	20	18	21	17	16
21	15	28	16	18	19	22	19	26
22	16	25	18	22	16	21	15	17
23	10	20	34	23	24	28	20	14
24	24	22	19	21	19	38	21	17
25	32	20	22	22	26	31	22	28
26	22	16	13	16	17	35	20	12
27	19	19	13	14	25	20	8	16
28	17	21	23	15	23	19	11	19
29	13	20	21	21	19	17	18	21
30	12	19	16	17	15	21	17	23

3 Gardens of the Royal Horticultural Society at

1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
15	21	14	22	27	20	12	17	23	11	24	10	17
12	20	23	24	33	17	7	21	21	19	19	21	10
18	19	30	24	22	17	5	17	22	19	26	19	28
21	29	33	23	34	19	16	23	27	10	27	25	15
32	27	21	21	25	21	25	24	34	7	30	17	26
34	30	27	24	10	18	24	31	34	12	19	15	21
16	25	18	29	22	9	12	26	24	24	23	22	24
22	35	28	23	26	15	12	17	27	21	23	20	28
15	29	14	19	36	32	7	15	29	14	10	22	30
33	22	10	14	17	32	15	16	15	26	29	22	24
14	22	13	17	26	20	17	15	16	15	15	30	23
14	23	17	28	20	22	21	21	24	18	11	30	18
11	20	15	15	21	16	10	21	31	29	15	28	24
14	12	15	15	40	21	19	22	14	26	11	23	14
8	19	13	8	33	30	18	25	16	26	16	30	9
8	12	18	19	34	16	16	15	22	27	19	29	18
12	19	15	21	26	15	21	16	29	16	21	27	20
5	11	17	11	31	14	25	27	14	9	20	16	19
10	5	19	19	32	20	14	25	14	16	26	33	21
3	15	20	21	19	15	16	28	16	17	30	22	15
0	18	17	26	24	15	19	15	9	17	18	25	21
9	26	32	21	20	14	24	13	13	22	16	28	8
15	19	19	12	19	15	26	10	18	21	16	24	8
6	18	23	17	7	22	16	32	11	19	20	9	21
3	19	30	14	17	26	19	13	23	9	28	19	17
5	25	15	22	27	21	24	7	23	21	17	19	22
6	21	21	22	19	15	16	11	22	20	18	22	15
0	16	24	25	21	10	11	18	20	17	25	20	18
2	24	27	26	16	18	11	17	25	17	13	18	18
6	26	20	28	24	26	17	17	15	13	9	11	20
9	20	19	17	19	12	16	17	12	21	16	14	14

Observations taken Society at
869.

DAY OF THE MONTH								
	184	1850	1851	1852	1866	1867	1868	1869
1	14 ⁰	10 ⁰	24 ⁰	5 ⁰	12 ⁰	25 ⁰	12 ⁰	13 ⁰
2	14	24	19	12	16	28	18	16
3	9	16	19	12	16	19	5	17
4	7	18	8	16	16	12	19	21
5	5	14	15	15	12	15	19	15
6	25	21	9	13	20	24	17	19
7	17	12	12	6	10	28	28	15
8	14	24	10	6	15	26	24	20
9	19	13	6	13	19	12	18	19
10	9	12	11	11	17	14	13	20
11	17	10	19	8	20	8	7	18
12	23	30	17	5	14	8	10	19
13	14	23	11	4	22	24	10	13
14	9	27	9	8	19	16	10	10
15	20	15	22	9	19	17	16	17
16	19	23	16	11	17	11	12	12
17	15	12	8	14	27	18	10	10
18	7	10	15	14	22	4	4	23
19	7	14	12	19	15	23	9	23
20	8	7	19	10	26	7	18	18
21	6	19	12	9	24	16	26	21
22	5	11	10	8	13	13	14	10
23	12	14	13	9	13	16	14	8
24	19	18	16	14	15	13	14	9
25	21	21	23	27	14	6	8	18
26	16	11	8	8	13	11	12	14
27	13	18	16	10	14	30	7	4
28	20	11	13	23	23	22	4	20
29	14	8	17	5	25	32	18	5
30	10	6	19	17	20	8	5	19

T

the Gardens of the Royal Horticultural Society at

1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
20	28	12	13	9	28	12	18	28	14	5	17	6	19
16	15	15	12	10	30	12	19	24	13	25	13	8	7
13	12	18	16	6	27	12	19	9	14	15	14	10	14
13	25	8	24	12	29	13	16	11	15	6	21	6	11
15	26	20	24	13	27	4	14	18	10	12	18	10	9
11	17	14	22	11	11	6	16	16	7	12	11	12	4
7	15	9	17	9	26	10	9	14	5	9	9	9	6
8	12	3	21	11	16	11	10	11	5	20	10	13	7
9	8	6	9	20	23	15	10	22	6	24	20	10	4
9	22	5	14	23	25	19	15	22	9	19	20	7	16
10	17	3	8	13	19	15	7	15	17	14	15	18	17
15	11	8	11	11	10	18	20	15	8	12	16	14	12
10	6	7	17	12	20	12	22	11	20	16	11	12	13
11	7	7	9	9	14	18	11	19	21	11	12	5	17
16	5	6	20	12	13	10	11	6	15	14	4	13	21
19	11	5	23	13	11	12	18	3	6	12	6	17	18
23	9	7	15	23	14	14	8	20	10	19	12	12	11
16	14	15	22	25	10	21	13	19	8	13	22	13	16
16	25	12	24	20	15	7	16	10	13	30	27	28	16
4	22	17	24	12	7	9	17	7	15	14	14	9	15
5	8	10	21	6	4	9	13	11	13	14	24	12	9
7	6	8	18	14	9	7	12	8	8	10	31	17	10
12	14	14	17	23	12	13	26	10	5	9	19	17	11
24	11	16	19	20	15	6	10	5	7	6	28	15	14
16	25	11	9	27	28	18	8	5	16	9	11	15	11
11	10	12	10	15	15	5	13	4	14	16	4	14	15
14	14	7	20	10	15	17	15	16	18	9	9	11	20
14	12	8	13	32	9	10	17	11	13	15	13	15	27
19	14	19	10	26	9	8	10	8	9	15	9	24	20
12	16	12	11	12	12	14	8	7	13	15	10	13	5
5	19	2	10	12	10	12	10	11	7	16	10	20	7

In January,	from	8.3	in 1830	to	19.4	in 1858
„ February,	„	9.7	„ 1843	„	21.2	„ 1857
„ March,	„	13.5	„ 1839	„	22.6	„ 1854
„ April,	„	14.8	„ 1829	„	30.6	„ 1865
„ May,	„	17.6	„ 1828	„	34.3	„ 1848
„ June,	„	16.4	„ 1830	„	33.1	„ 1858
„ July,	„	17.6	„ 1829	„	30.4	„ 1864
„ August,	„	17.0	„ 1829	„	30.5	„ 1864
„ September,	„	16.1	„ 1827	„	31.2	„ 1865
„ October,	„	13.6	„ 1838	„	24.1	„ 1861
„ November,	„	11.0	„ 1835	„	20.3	„ 1861
„ December,	„	8.1	„ 1844	„	16.5	„ 1861.

Mean daily ranges, differing so greatly in each month, may well be attended with different agricultural and horticultural results.

The numbers in the bottom line show the average daily range in each month; and by taking the difference between these numbers and those in each year, the departure from the average will be found.

The gradual increasing numbers, from January 12°·2 to July 23°·5, and the gradual decrease month by month to December 12°·2, the same as January, indicates the annual law of daily range of temperature.

By taking the mean of all the daily ranges on the same day of the year from all the years, or the means of the numbers in every horizontal line in Tables XXX. to XLI. Table XLIV. was formed.

By selecting the least and greatest of these mean values in each month we find that the mean daily range of temperature has varied

In January,	from	9.7	on the 11th day	to	16.0	on the 29th
„ February,	„	12.4	„ 2nd	„	16.4	„ 17th
„ March,	„	13.6	„ 2nd	„	20.4	„ 31st
„ April,	„	18.4	„ { 9th and 12th }	„	23.5	„ 20th
„ May,	„	20.9	„ 1st	„	24.6	„ 17th
„ June,	„	21.2	„ 7th	„	25.3	„ 23rd
„ July,	„	20.9	„ 24th	„	26.8	„ 5th
„ August,	„	20.9	„ 6th	„	24.7	„ 4th
„ September,	„	19.7	„ { 16th and 28th }	„	24.7	„ 12th
„ October,	„	15.5	„ 31st	„	21.1	„ { 5th and 6th }
„ November,	„	13.0	„ 23rd	„	16.9	„ 3rd
„ December,	„	10.8	„ 21st	„	14.1	„ 25th.

The smallest range in the year is therefore on January 15, and the largest is on July 5.

By taking the mean of all the numbers in each column the mean monthly daily range is shown; these are the same as in the bottom line of Table XLIII., and these agreements are a proof of the general accuracy of the work.

TABLE XLII.

Showing the Greatest and Least Ranges of Temperature in every Month, as Deduced from the Observations taken at the Gardens of the Royal Horticultural Society, Chiswick, 1826-1869.

Year	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	Greatest	Least	Greatest	Least	Greatest	Least	Greatest	Least	Greatest	Least	Greatest	Least	Greatest	Least	Greatest	Least	Greatest	Least	Greatest	Least	Greatest	Least	Greatest	Least
1826	18	2	23	2	28	7	27	9	33	2	36	7	35	5	35	15	29	7	28	3	25	5	17	0
1827	20	4	23	4	24	7	35	9	32	9	33	7	37	8	29	8	21	9	25	8	20	4	20	4
1828	22	1	20	4	27	6	27	7	30	12	32	8	27	11	30	6	29	10	28	3	26	7	18	4
1829	22	2	23	4	27	4	28	5	30	12	35	11	27	5	28	7	30	10	26	6	25	3	22	1
1830	22	3	24	4	39	3	30	3	34	9	27	7	28	6	32	9	33	4	29	10	29	3	25	3
1831	19	2	29	3	25	4	26	9	36	7	34	10	31	10	32	13	33	9	24	6	27	5	20	3
1832	22	4	23	3	25	6	34	10	32	5	30	11	29	12	30	5	39	14	28	8	22	4	25	2
1833	15	2	20	7	25	3	30	12	35	8	34	11	32	8	41	9	30	8	31	8	22	6	21	5
1834	18	4	28	3	27	7	32	6	35	16	38	9	36	9	31	7	35	12	42	5	25	4	32	4
1835	22	5	24	8	33	10	38	5	35	13	35	11	38	17	43	17	40	13	29	6	20	4	20	2
1836	19	5	28	2	32	5	28	10	37	14	36	7	42	14	31	14	29	7	28	7	25	6	20	4
1837	23	4	23	5	25	5	31	4	34	13	38	14	37	17	36	8	27	9	30	10	23	5	23	2
1838	22	3	27	4	32	6	27	9	38	10	32	7	32	16	33	13	38	6	24	5	23	4	18	2
1839	21	4	25	4	20	5	32	3	32	13	26	6	32	7	31	12	30	10	28	4	26	3	26	4
1840	26	5	25	3	34	5	42	16	36	7	34	10	33	10	39	8	31	9	34	7	28	7	21	2
1841	22	3	27	3	36	6	31	7	34	7	31	11	28	7	30	7	36	8	31	4	31	5	22	4
1842	21	2	24	5	28	4	38	7	34	9	41	12	35	12	40	12	27	7	34	7	25	2	22	1

1843	24	3	24	5	38	7	28	4	30	8	36	11	37	14	40	11	33	6	23	4	21	3
1844	28	6	26	7	34	5	44	12	39	11	41	16	36	11	37	14	40	11	33	6	23	4
1845	28	3	35	6	33	8	39	10	28	7	37	5	32	5	29	10	38	7	31	6	34	5
1846	19	5	24	7	31	9	29	8	38	5	40	13	45	12	32	5	34	13	29	5	26	3
1847	23	3	34	5	35	7	34	3	39	12	37	10	40	13	46	7	35	9	27	6	29	5
1848	22	2	23	4	36	6	42	5	44	15	30	10	33	8	33	6	40	4	25	7	26	7
1849	25	2	29	4	29	3	31	7	34	6	43	8	38	13	36	7	32	10	28	10	27	7
1850	30	3	32	2	33	9	29	11	35	4	38	9	33	9	35	13	38	13	33	6	30	6
1851	21	3	25	4	21	3	31	9	35	10	39	7	30	7	32	9	39	13	29	6	24	4
1852	24	7	21	8	40	9	42	10	32	6	32	10	38	16	32	7	32	10	26	5	27	4
1853	23	5	18	4	29	6	35	9	33	5	35	4	26	12	29	11	32	11	27	6	28	3
1854	24	1	27	6	37	9	41	6	34	13	30	7	37	9	39	5	45	8	38	8	29	8
1855	22	6	27	5	28	3	43	12	36	9	33	8	43	13	38	8	43	7	31	6	32	7
1856	22	4	25	3	40	4	41	8	31	5	38	10	38	12	46	10	41	9	30	5	26	6
1857	24	6	31	11	31	9	33	6	35	13	39	21	43	14	39	13	36	10	34	5	28	5
1858	31	9	22	4	38	5	43	8	38	7	44	22	40	14	44	12	46	10	35	5	26	7
1859	17	3	27	9	28	7	35	7	35	10	26	15	41	16	40	13	36	11	33	10	29	9
1860	30	8	31	9	29	8	34	4	35	14	32	11	40	15	28	7	38	10	29	8	28	7
1861	31	4	26	6	33	6	36	11	38	6	37	11	35	10	49	12	41	13	40	7	33	8
1862	25	5	29	2	35	5	42	8	40	7	37	12	40	11	41	8	48	9	32	9	25	6
1863	27	5	38	7	33	14	38	11	35	8	38	12	41	12	34	10	31	13	26	5	27	9
1864	24	3	22	5	35	10	40	7	42	4	38	14	40	21	43	16	34	12	32	7	32	9
1865	24	7	32	6	28	10	48	13	41	10	50	12	40	19	41	10	43	15	34	9	30	4
1866	22	7	26	8	27	10	36	10	41	10	40	12	35	13	39	8	26	12	29	7	27	10
1867	32	5	26	6	35	4	28	7	32	7	42	11	39	11	32	12	38	15	30	9	82	4
1868	19	3	24	5	30	7	35	11	40	14	42	16	36	14	31	9	42	8	33	9	28	4
1869	20	4	23	4	25	5	38	4	29	5	39	9	37	12	36	9	32	8	30	8	23	4

TABLE XLIII.

Showing the Mean Range of Temperature of every Month, as deduced from the Observations taken at the Gardens of the Royal Horticultural Society, Chiswick, 1826-1869.

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1826	9°	11°	15°	17°	18°	24°	23°	22°	18°	16°	13°	8°
1827	11°	13°	14°	18°	19°	20°	21°	17°	16°	16°	11°	10°
1828	9°	11°	16°	15°	17°	18°	17°	17°	18°	17°	13°	10°
1829	9°	11°	14°	14°	23°	22°	17°	17°	19°	16°	12°	8°
1830	8°	12°	17°	17°	18°	16°	19°	20°	19°	19°	14°	10°
1831	8°	13°	14°	17°	22°	20°	24°	22°	19°	14°	12°	11°
1832	10°	12°	15°	20°	20°	19°	22°	20°	24°	17°	12°	12°
1833	8°	12°	14°	19°	26°	21°	22°	24°	20°	19°	13°	11°
1834	10°	15°	17°	20°	25°	25°	21°	21°	22°	20°	13°	12°
1835	13°	14°	17°	22°	21°	24°	27°	29°	22°	18°	11°	11°
1836	11°	13°	14°	17°	23°	20°	24°	23°	17°	15°	15°	10°
1837	10°	13°	13°	17°	22°	25°	25°	23°	19°	21°	16°	10°
1838	10°	12°	18°	17°	23°	22°	22°	20°	21°	13°	13°	11°
1839	12°	14°	13°	15°	22°	18°	18°	21°	19°	16°	11°	11°
1840	12°	11°	16°	22°	20°	20°	18°	23°	20°	19°	13°	10°
1841	11°	9°	20°	19°	20°	20°	17°	19°	19°	14°	14°	11°
1842	9°	13°	14°	20°	22°	27°	23°	22°	17°	18°	11°	11°
1843	10°	9°	16°	18°	18°	18°	18°	20°	24°	18°	17°	11°
1844	14°	16°	17°	30°	32°	27°	23°	23°	32°	19°	19°	11°

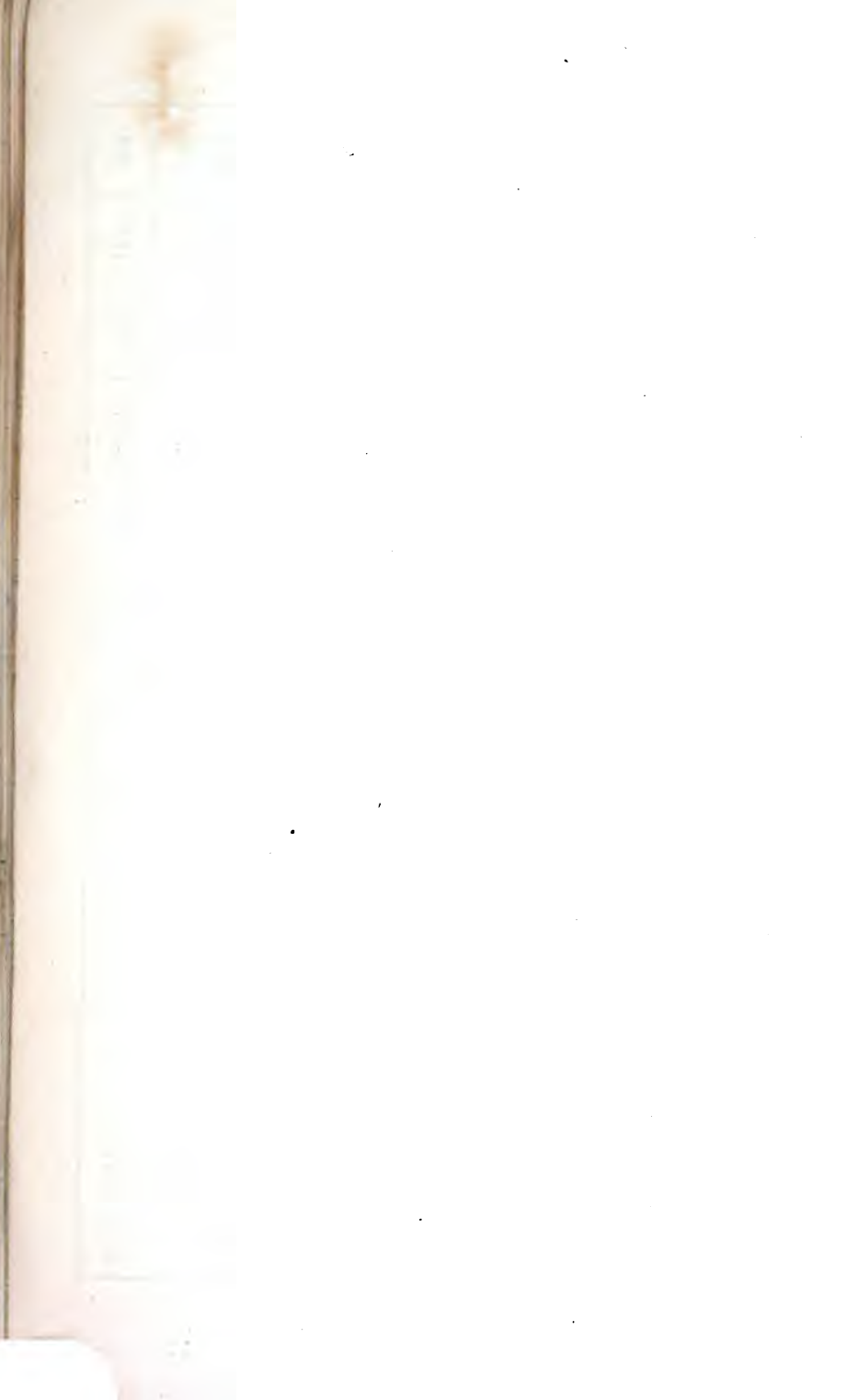
1845	13.7	16.8	17.0	23.4	19.1	24.1	19.3	19.6	20.6	19.6	17.6	15.6
1846	12.4	15.8	20.9	19.1	24.3	29.3	23.6	20.7	23.3	15.5	12.3	13.0
1847	10.4	13.9	20.6	20.5	24.2	21.6	25.9	24.3	21.7	16.6	12.3	10.4
1848	11.3	13.4	17.8	21.6	34.3	20.4	22.7	20.8	22.2	16.9	16.0	13.6
1849	11.3	15.7	15.5	18.3	20.6	25.3	25.7	22.2	19.2	16.7	16.7	11.8
1850	11.7	15.4	21.5	20.6	20.1	27.2	21.9	24.5	23.6	19.8	15.6	14.5
1851	11.8	15.6	13.5	19.0	23.4	23.4	19.5	21.5	22.2	14.5	14.3	10.7
1852	15.5	15.2	20.7	23.1	18.1	18.5	26.3	20.0	19.0	15.5	11.4	11.7
1853	11.5	11.0	18.7	18.0	21.7	20.7	19.3	19.7	19.2	17.0	14.4	11.5
1854	11.7	15.4	22.6	25.4	22.7	18.1	22.7	22.4	28.5	21.4	17.5	15.1
1855	11.8	15.0	17.8	23.8	21.7	22.6	24.3	24.8	26.0	18.7	13.9	14.7
1856	12.7	13.4	16.7	22.9	20.0	26.2	25.3	25.6	24.8	17.6	16.0	12.9
1857	13.7	21.2	18.2	20.7	25.4	29.3	26.8	26.0	24.3	20.3	14.6	14.7
1858	19.4	14.5	19.8	24.6	25.0	33.1	27.0	28.8	24.1	20.9	16.0	10.2
1859	10.9	17.5	15.0	19.4	22.5	21.2	28.9	26.4	21.8	20.2	18.9	16.2
1860	15.6	18.5	17.6	20.5	24.5	19.5	24.7	18.5	23.7	20.2	15.7	15.2
1861	14.9	15.8	19.7	23.4	26.7	26.0	25.3	29.1	26.2	24.1	20.3	16.5
1862	16.3	11.9	16.4	20.3	22.8	24.1	26.3	26.1	24.6	18.8	13.5	11.9
1863	13.5	18.9	20.1	22.7	24.5	23.4	29.3	23.3	22.0	16.5	16.6	13.8
1864	15.2	13.5	19.3	23.0	25.4	26.5	30.4	30.5	22.9	19.1	18.3	12.7
1865	14.5	14.2	18.0	30.6	25.2	30.6	27.9	27.2	31.2	20.7	14.1	11.4
1866	12.8	16.0	16.7	19.5	25.1	27.4	25.5	23.3	18.5	18.0	17.6	14.1
1867	15.7	14.7	14.6	17.9	22.1	24.4	22.4	22.4	23.7	19.7	16.9	14.8
1868	11.1	15.3	16.1	20.1	24.9	23.3	26.6	20.7	22.4	21.6	13.4	13.0
1869	11.6	13.5	14.3	20.8	18.3	23.3	24.6	23.7	18.5	18.9	15.3	12.9
Means	12.2	14.2	17.1	20.6	22.6	23.4	23.5	22.8	21.7	18.2	14.7	12.2

TABLE XLIV.

Showing the Mean Range of Temperature of every day in the year, as determined from all the Thermometrical observations taken at the Gardens of the Royal Horticultural Society at Chiswick, 1826-1869.

DAYS OF THE MONTH	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	12.0	12.5	14.0	19.0	20.9	23.8	21.5	28.8	22.9	18.1	16.2	13.6
2	12.9	12.4	13.6	18.7	22.2	23.5	21.5	23.7	23.3	19.3	16.6	13.5
3	13.5	14.5	17.0	20.4	21.8	24.0	22.9	23.0	22.2	18.8	16.9	11.6
4	11.3	12.7	17.0	19.7	22.6	24.5	24.8	24.7	24.1	21.1	15.5	11.8
5	12.2	12.8	17.4	19.5	21.5	22.7	26.8	22.9	23.0	21.1	15.7	14.0
6	11.9	13.5	16.2	18.9	21.8	22.6	24.7	20.9	22.4	19.2	15.4	11.6
7	12.7	13.1	17.4	19.6	22.5	21.2	22.1	23.4	21.6	18.8	14.8	11.7
8	11.8	12.7	16.6	19.8	22.0	23.3	23.1	23.6	20.7	19.9	15.5	11.1
9	10.6	13.1	18.0	18.4	22.3	22.3	24.4	23.2	20.2	18.5	16.2	12.3
10	10.6	13.9	18.0	20.3	21.6	23.8	24.5	23.5	22.9	18.6	15.4	12.6
11	9.7	14.3	16.5	20.0	21.6	24.0	24.2	23.3	23.9	18.3	14.4	12.7
12	11.3	14.7	18.3	18.4	22.0	22.2	24.3	23.6	24.7	18.7	16.1	11.6
13	11.8	14.4	18.0	20.5	24.5	22.4	23.8	23.6	22.0	18.8	15.1	13.6

14	11.7	14.8	15.3	20.5	22.0	23.8	24.4	21.2	20.9	17.7	13.8	12.1
15	12.5	15.2	16.9	20.3	23.3	23.2	25.4	22.2	21.8	18.0	15.1	11.5
16	11.8	16.0	16.3	19.2	23.1	23.8	25.2	21.6	19.7	17.6	14.5	12.1
17	11.7	16.4	16.2	20.3	24.6	25.0	24.0	22.5	21.9	18.4	14.2	12.2
18	12.4	14.1	16.7	21.5	24.2	22.8	23.7	22.1	22.1	17.1	13.7	12.5
19	12.5	14.2	17.1	21.9	23.1	21.8	22.1	21.2	21.3	19.2	15.0	12.2
20	11.5	14.7	16.3	23.5	22.9	22.7	22.3	21.0	22.3	19.0	14.5	11.3
21	11.3	15.1	16.5	21.4	21.3	23.9	22.3	22.8	20.9	18.1	13.8	10.8
22	12.2	14.0	15.8	20.6	21.9	24.0	21.9	21.2	21.0	16.7	14.1	11.7
23	12.2	15.6	17.1	21.0	23.2	25.3	21.6	22.7	20.7	16.3	13.0	12.4
24	12.3	14.2	18.0	21.2	22.9	23.8	20.9	23.0	21.1	16.6	14.1	11.9
25	12.3	15.0	17.4	21.8	22.1	22.4	23.2	21.6	22.3	17.1	13.4	14.1
26	13.1	13.9	18.9	22.7	23.6	24.2	22.4	23.9	21.2	18.7	13.1	11.5
27	12.6	13.5	19.2	22.3	24.2	23.8	23.0	23.8	19.9	16.6	13.7	12.5
28	14.3	15.4	17.7	23.1	22.3	23.4	23.8	22.7	19.7	16.8	13.7	13.1
29	15.0	16.1	20.0	22.3	22.4	24.4	24.4	22.7	20.1	17.9	13.4	11.6
30	12.9		18.8	21.5	22.9	23.6	24.5	24.5	21.2	17.6	13.2	11.8
31	13.0		20.4		23.6		23.5	23.0		15.5		10.9
Means	12.2	14.2	17.1	20.6	22.6	23.4	23.5	22.8	21.7	18.2	14.7	12.2



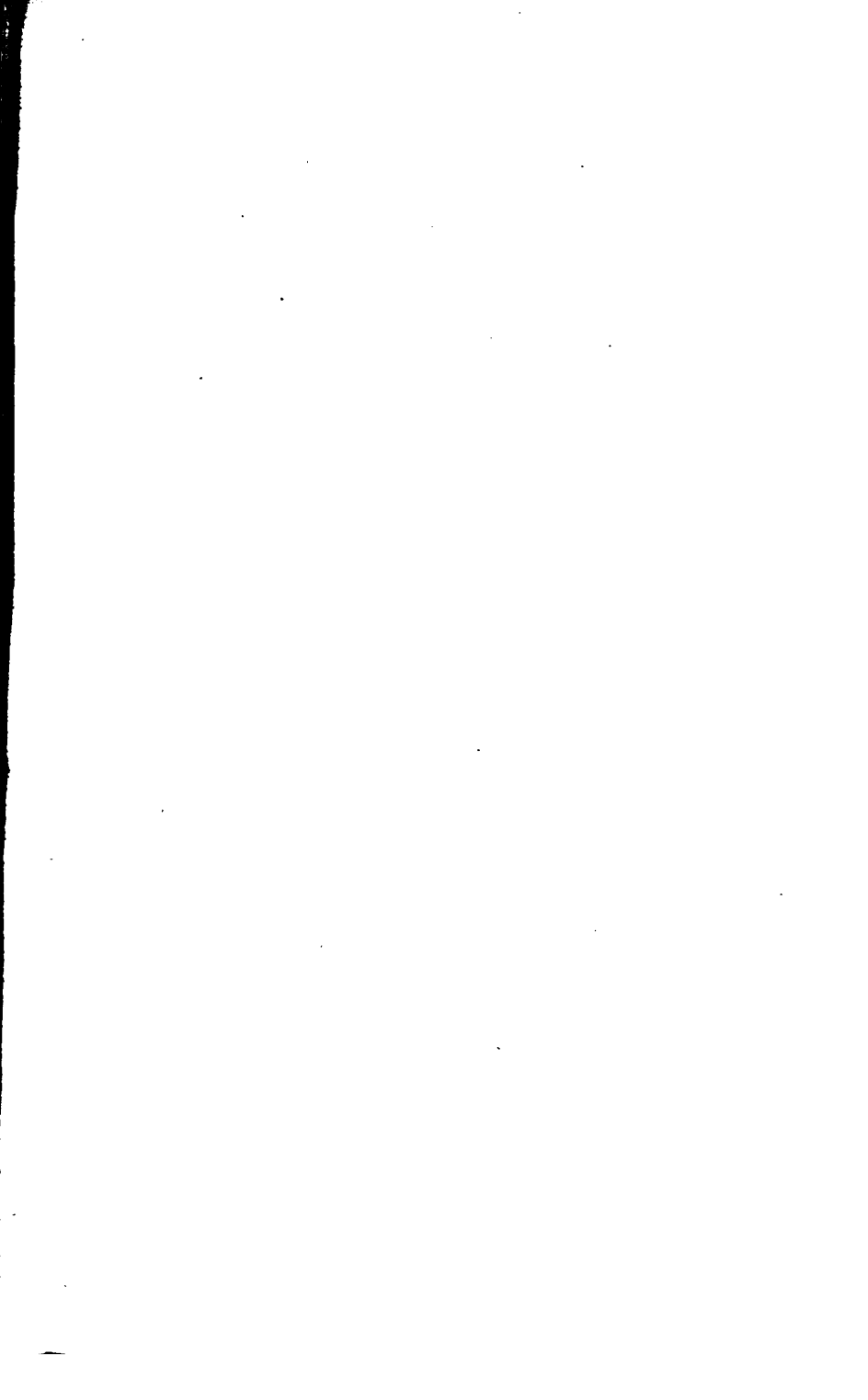
ON THE
FALL OF RAIN

DAILY, MONTHLY, AND YEARLY

AT THE
ROYAL HORTICULTURAL GARDENS
CHISWICK

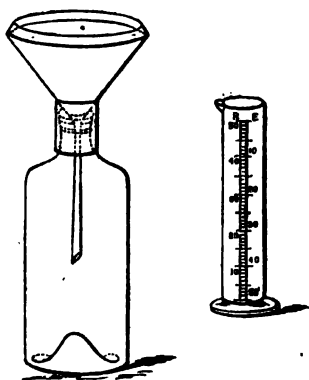
FROM THE BEGINNING OF THE YEAR 1826

TO THE END OF THE YEAR 1869



THE FALL OF RAIN.

IN the *Meteorological Journal* of the Royal Horticultural Society, the rainfall on every day that any fell, has been carefully recorded. The rain-gauge with which the observations were at first made, is stated to have been constructed according to Mr. Howard's directions in his work upon the *Climate of London* (see vol. vii. of the '*Transactions of the Society*,' page 100), and the following description is extracted from that work :—



HOWARD'S RAIN-GAUGE.

'The rain-gauge consists of three pieces, a funnel, a bottle, and the measure. The funnel is most conveniently made of five inches opening, and of the form represented in the figure: the mouth-piece of brass, turned in a lathe, the remainder of tinned copper. It has two necks: the inner and longer one, widening a little downwards, enters deep into the bottle, and conveys the rain: the outer neck is soldered on the cone of

the funnel, having no opening into the latter: it serves the necessary purpose of preventing the entrance of water from the outside; and by resting on the shoulder of the bottle, it gives steadiness to the funnel.

'As to the bottle, a common wine-quart will contain from two to two and a half inches of rain on this funnel: but it is better to use a three-pint bottle (technically termed a Winchester-quart), which has the proportions given in the figure. For an unusual fall of rain may happen, when a previous quantity has not been measured out; and it is on such occasions that we would wish, more especially, to be certain of the amount.

'A cylindrical glass of the depth of eight inches, exclusive of its foot, and $1\frac{1}{2}$ inch in diameter, serves to make the measure. It is graduated into parts, each of which is equal in capacity to the depth of $\frac{1}{100}$ of an inch on the area of the mouth of the funnel. A glass of the above size will measure out fifty such parts, or half an inch at once. The graduation is conducted on the principle (which is a medium between calculation and experiment) that a cylinder of water at a mean temperature, an inch deep, and five inches in diameter, weighs 10 ounces troy. The hundredth part of this, or 48 grains, is accordingly taken for the graduating quantity, and the scale is formed by successive additions, at each of which the surface is marked. Considering the nature of this operation, which scarcely admits of our going to fractions of a grain, I suppose the above standard to be sufficiently correct. I have been accustomed to etch the scale on the glass with fluoric acid, but it is more conspicuous when engraved at the glass-cutter's wheel. Previously to sending it for this purpose, the whole scale should be traced, either on a strip of paper pasted on before it is divided, or in oil paint on the glass itself. A diamond, or steel point, may be used for engraving the scale, in default of other means.'

This gauge was not in use lately, but when changed I cannot find any record.

The first step in this investigation was to form Tables precisely similar to those for the temperature of the air, showing at a glance the daily falls of rain on the same day of the year, throughout the series of forty-four years, and in this way Tables I. to XII. were formed.

at the Gardens of the L

DAY OF THE MONTH										SUMS
	1850	1851	1852	1853	1854	1855	1867	1868	1869	
1	..	·02	...	·03	...	·02	...	...	·04	1'75
2	..	...	·02	·18	...	·01	...	...	·02	1'01
3	02	·56	·10	...	...	...	...	...	·12	2'50
4	..	·02	...	·12	·86	...	...	...	·08	2'33
5	..	...	...	·01	·03	...	·54	...	·08	2'46
6	..	...	...	·16	·08	...	...	...	·44	2'05
7	..	·02	·06	·34	·33	...	·46	...	...	2'74
8	..	·08	...	...	...	...	·01	...	...	0'86
9	..	·07	...	·01	·06	·02	·29	...	...	2'17
10	..	·21	·08	·06	·02	...	...	...	...	1'85
11	..	·02	·07	·02	...	...	...	·23	...	4'50
12	..	·01	·62	·24	·02	...	...	·04	...	4'80
13	..	...	·24	...	·08	...	...	·08	...	2'86
14	..	...	·16	·04	·10	...	...	·08	·08	2'61
15	..	...	·26	·12	...	...	...	...	·08	1'80
16	..	·20	·07	·28	·01	·01	...	...	·08	2'23
17	..	·48	...	...	·01	...	...	·01	...	1'40
18	55	...	...	·08	...	...	...	·56	...	2'96
19	02	...	...	·05	...	...	...	·06	...	3'72
20	..	·48	·03	·17	·01	...	...	...	...	2'79
21	..	·09	·26	·06	...	...	...	·07	...	2'77
22	..	...	·01	...	...	...	·12	·02	...	1'87
23	..	...	·01	...	...	...	·01	...	...	1'50
24	01	...	·10	...	·02	...	...	·44	...	2'84
25	4	...	·06	...	·06	·04	...	...	...	2'57
26	2	·02	...	...	...	...	·14	...	...	2'34
27	..	·02	·28	·04	·03	...	·02	·04	...	2'42
28	1	·12	...	...	·10	...	...	...	·52	2'07
29	8	·20	·04	...	·10	...	...	·01	·26	1'80
30	..	·38	·11	·13	...	...	·47	...	·12	3'40
31	8	·07	·14	...	...	...	·10	...	·06	2'91
Sums	3	3·07	2'72	2'14	1'92	0·10	2'16	1'64	1'98	75'88

ticultural Society at Chiswick.

1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	SUMS
...	...	...	...	...	...	...	...	·37	...	·02	·16	2'30
...	...	...	...	...	·08	...	·06	·06	...	·26	...	2'85
·30	...	·06	...	...	·01	·02	...	·25	·01	...	·10	2'63
·28	·15	...	...	...	·03	...	...	·35	·08	...	·10	2'86
...	·22	·26	·01	...	...	...	·12	·02	·14	...	...	2'49
...	·02	...	·01	...	...	...	·04	...	·04	...	...	0'88
...	...	·02	·04	...	·06	...	·09	·10	·22	·01	...	2'40
...	·10	·06	·02	...	...	...	...	·14	·02	...	·02	2'74
...	·14	...	·08	...	...	...	...	·48	·06	...	·04	2'21
...	·09	...	...	...	...	...	...	·06	·21	...	·02	1'95
·02	·04	...	...	...	·02	·20	...	·50	·02	...	·52	2'76
·03	·22	...	...	...	...	·18	...	...	...	...	·26	1'73
·37	·08	...	·07	...	...	...	...	...	...	...	...	1'60
·48	·02	...	·12	...	...	...	...	·18	...	...	...	1'99
...	·06	·30	·01	...	...	·05	...	·35	·10	·06	...	1'96
...	...	·01	·04	·06	...	·04	...	·24	·38	...	...	1'21
...	·01	·01	...	·14	...	·03	·44	·12	...	...	·20	1'91
...	...	...	·01	·02	·01	...	·06	...	...	...	...	1'28
...	·02	...	...	·09	·04	...	·02	...	...	...	...	2'32
...	·04	...	·10	·06	...	...	...	...	...	...	·18	2'94
...	...	...	·17	...	·01	...	·12	...	...	·12	·18	1'80
...	·02	...	·08	·01	...	...	·02	·02	...	...	...	1'53
...	...	...	·44	...	...	...	·10	...	...	...	...	2'14
...	...	...	·07	...	...	·14	·38	·01	...	...	·08	2'88
...	...	·01	·01	...	...	...	·01	·08	·01	...	...	2'64
...	·06	·40	...	...	...	...	·16	·43	·04	...	...	4'18
...	...	·07	·12	...	...	·02	...	·04	...	...	...	1'90
...	...	...	·01	...	...	...	·01	...	...	...	·12	2'66
...	...	...	...	...	...	·08	...	...	...	·48	...	0'93
1'48	1'29	1'20	1'41	0'38	0'26	0'76	1'63	3'80	1'33	0'95	1'98	63'67

the Gardens of the

DAY OF THE MONTH										SUMS
	1850	1851	1852	1853	1854	1866	1867	1868	1869	
1	·05	·27	...	...	...	·07	·12	2'31
2	·10	...	...	...	·02	·08	2'23
3	·02	...	...	...	...	...	·01	·02	...	2'42
4	·02	...	...	...	...	...	1'51
5	...	·10	...	·12	...	...	...	...	...	2'21
6	·02	...	·10	...	...	...	1'65
7	·11	...	·02	...	·22	...	1'44
8	·03	...	·03	·08	...	...	1'06
9	...	·06	...	...	...	...	·46	...	...	1'97
10	...	·05	·01	...	·01	...	·03	...	...	2'11
11	·04	·14	...	1'90
12	...	·23	...	...	...	...	·06	·01	...	1'79
13	·36	...	...	·40	...	...	2'33
14	...	·70	...	·18	·02	...	...	·01	...	3'89
15	...	·37	...	...	·01	·01	·11	...	...	1'72
16	·01	...	·01	·20	...	...	·02	2'85
17	...	·30	...	...	...	·04	...	...	...	2'02
18	...	·10	...	...	·19	·04	·06	...	·06	0'95
19	...	·33	...	...	·15	·06	·25	...	·16	1'37
20	·01	·22	·28	...	·24	3'32
21	...	·02	...	·01	...	·07	·02	...	·12	1'34
22	...	·44	...	...	...	·02	·04	...	...	1'44
23	·01	·13	...	·01	...	·40	...	·08	...	2'47
24	·01	·02	...	·06	...	·08	·12	...	...	0'90
25	...	·14	...	...	...	...	...	·36	...	2'00
26	·01	·17	...	...	·02	·02	...	...	...	0'84
27	...	·02	...	...	...	·10	...	...	·02	1'77
28	·04	...	...	...	2'83
29	...	·33	·16	...	...	...	...	...	·04	1'35
30	...	·06	·02	...	...	·14	·01	...	...	2'07
31	·08	...	...	·19	...	·06	...	...	...	2'17
Sums	·13	3'57	0'25	1'48	0'42	1'65	1'97	0'93	0'86	60'23

icultural Society at Chiswick.

7	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	Sum
	·02	·09	·14	·36	·02	...	...	...	...	...	...	...	2·56
	·02	·01	·22	·37	·24	...	...	...	·04	...	...	·08	3·42
	·09	...	·01	·04	...	...	·03	...	...	...	...	·04	1·39
	...	...	...	...	...	·04	·18	...	·10	·02	...	...	2·30
	...	...	·01	...	·04	...	·54	·06	·02	·01	...	...	2·58
	·09	...	...	...	·12	·06	...	...	·01	...	...	·24	1·29
	·50	...	...	...	·01	·01	...	...	·01	·02	·04	·02	2·54
	·46	·10	·01	...	·69	·11	...	...	...	·14	·07	...	2·81
	...	·02	...	...	·73	·06	...	...	·21	·02	·06	...	2·81
	...	...	...	...	·05	·05	...	...	...	·02	...	...	1·17
	...	·01	...	...	...	·02	...	...	·25	...	...	...	2·11
	...	·34	·02	...	...	·01	...	...	·02	·03	...	...	2·84
	...	...	·01	...	...	...	...	...	·02	·09	...	...	1·69
	...	·36	·01	...	...	...	...	·09	·08	·30	...	·02	1·82
	...	·08	...	...	...	...	...	...	·10	·04	...	...	1·93
	·16	·07	...	...	·02	...	...	·16	·04	·06	...	·26	2·75
	...	...	...	...	...	...	...	·02	...	·01	...	·02	1·47
	...	...	...	...	·01	...	...	·02	...	...	...	...	1·93
	...	...	·01	...	...	...	...	...	...	·01	·12	...	1·08
	...	...	...	...	...	...	...	...	·14	·32	·24	...	2·23
	...	...	·07	...	...	...	...	...	...	·01	·04	...	1·38
	...	...	·02	·01	·11	...	...	...	...	·05	·06	...	2·58
	...	·28	·16	·08	·01	...	...	...	...	·12	...	·54	3·41
	...	·12	·26	·01	·05	...	...	...	...	·18	·06	...	2·90
	·10	·33	...	...	·12	...	...	...	...	·01	...	...	3·98
	...	...	...	·03	·04	...	·01	...	...	·02	...	...	1·20
	...	...	...	·54	...	...	...	...	·74	·03	...	...	2·33
	·64	·08	...	...	...	·02	·01	...	·10	...	·24	...	2·33
	·05	...	...	...	...	·04	...	...	·10	·04	...	...	2·59
	...	·12	...	...	·03	·12	...	...	...	·12	...	...	1·19
	2·18	2·01	0·95	1·44	2·29	0·54	0·77	0·35	1·98	1·67	0·93	1·22	66·61

the Gardens of the

DAY OF THE MONTH	1850	1851	1852	1853	1854	1867	1868	1869	SUMS
1	...	...	...	...	161	...	...	...	1'62
2	...	...	01	06	021	...	...	...	1'79
3	...	09	...	58	010	...	...	48	2'65
4	08	02	...	...	1	...	...	84	2'45
5	35	02	...	...	044	...	...	02	4'36
6	68	01	...	...	...	...	...	06	3'53
7	04	...	...	24	89	...	...	02	3'40
8	22	...	...	02	625	...	...	06	3'83
9	...	...	...	24	172	...	06	28	3'76
10	...	03	05	02	1	52	09	...	2'44
11	01	...	09	...	5	...	...	...	2'39
12	01	29	25	...	4	07	...	...	3'96
13	04	...	02	13	...	01	...	...	2'83
14	...	...	02	01	...	...	...	...	2'29
15	...	...	...	...	...	...	...	...	2'52
16	01	05	...	...	...	...	...	02	1'49
17	02	...	33	...	...	...	...	...	2'33
18	01	10	11	...	...	...	...	16	1'48
19	...	04	...	...	...	02	...	22	2'54
20	02	...	10	...	07.	76	...	...	3'56
21	11	...	...	...	19.	09	...	...	2'77
22	06	...	...	...	30.	12	08	...	1'58
23	...	...	...	...	10.	...	24	...	2'39
24	...	...	...	...	08.	...	18	...	2'88
25	03	08	11	...	12.	35	...	10	2'44
26	03	01	35	...	480	02	...	...	2'76
27	02	...	01	...	12.	...	...	44	3'44
28	10	...	03	18	42.	...	...	36	3'99
29	...	...	25	02	40.	04	40	...	4'18
30	...	...	01	08	34.	04	...	...	1'55
31	...	...	...	02	...	01	...	20	2'99
Sums	1'84	0'74	1'74	1'60	4'037	2'05	1'05	2'76	86'19

cultural Society at Chiswick.

1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	Sums
...	·22	...	·08	...	...	...	·76	·01	...	...	...	2·12
...	·03	·87	·04	...	...	·07	·19	...	·78	...	·10	3·82
...	·52	·04	·13	·02	...	·26	·02	·46	·05	...	...	3·02
...	·14	·07	·01	...	...	...	...	1·02	...	...	...	2·66
·60	·64	·82	·01	·28	·90	...	...	·02	·24	...	...	4·76
·08	...	·08	...	·03	·22	·02	...	...	·02	...	...	1·56
...	...	·12	...	·06	·16	...	...	...	·10	...	...	2·44
...	...	·09	·01	...	·09	...	...	...	...	...	...	1·20
·03	...	·26	·58	·03	·06	...	...	...	...	...	...	4·06
...	...	·04	·15	·04	·04	·03	...	...	...	...	...	2·65
...	...	·06	...	·20	·82	...	...	...	...	...	...	1·97
...	·57	·40	...	·50	·83	·06	...	·04	·06	...	...	4·83
·03	...	...	...	·06	·04	·46	...	·18	...	...	·66	4·20
...	...	·02	...	·48	·07	·08	...	·01	...	...	·12	2·76
...	...	·07	...	·20	...	·16	...	·01	·12	...	·06	2·35
...	...	·28	...	·08	·25	...	...	·16	...	...	·06	2·14
·01	...	·54	...	·12	...	·14	...	·05	...	...	·20	3·48
...	...	...	...	·03	·84	·01	...	·09	...	...	·04	2·92
·01	·01	·34	...	·05	·36	...	...	·02	...	...	...	3·17
·02	·13	·12	·46	...	...	...	...	·01	...	·06	...	2·20
...	...	·19	·36	...	...	...	...	·84	...	·16	·12	4·09
...	...	·04	·01	·06	...	...	...	...	...	·02	...	2·30
...	...	·08	·02	...	...	·17	...	...	...	·08	...	2·24
...	...	·11	·10	...	·74	...	...	...	...	...	...	2·78
...	...	·56	·15	...	...	·08	...	...	...	...	...	3·94
...	·10	·01	·05	...	·02	·02	...	...	...	...	...	3·93
...	·12	·04	·03	·02	·02	·08	...	·02	...	...	...	2·34
...	·62	·18	·16	...	...	...	·02	...	...	...	...	3·03
...	...	·22	...	·07	...	·06	·42	...	...	...	...	1·30
...	...	...	...	...	...	...	·43	·66	...	·01	...	3·11
0·78	3·10	5·15	2·35	2·33	4·46	1·70	1·84	3·60	1·37	0·33	1·26	87·37

VII.

869 at the

DAY OF THE MONTH										SUMS
	18268	1849	1850864	1865	1866	1867	1868	1869		
1	...	...	... ..	...	13	24	...	...	4'09
2	...	...	... 14	...	04	04	...	...	1'04
3	...	01	25 08	...	16	14	...	...	3'38
4	...	...	33 ...	...	13	02	...	...	1'47
5	...	...	... ..	...	03	...	...	...	2'54
6	...	...	09 02	48	19	...	...	...	2'89
7	...	...	34 ...	01	01	...	...	...	2'38
8	04	...	... ..	...	03	...	...	...	2'81
9	...	...	15 ...	10	...	...	...	...	2'99
10	...	...	... ..	06	...	...	...	...	2'40
11	...	...	... ..	...	...	...	72	...	3'62
12	...	...	... ..	04	...	...	26	18	2'98
13	14	...	... ..	07	...	26	...	...	3'24
14	...	...	... ..	...	...	09	...	...	2'68
15	04	...	01 ...	...	...	28	14	...	4'73
16	12	...	04 ...	04	...	27	...	...	3'65
17	...	07	34 01	20	...	32	...	...	3'18
18	...	06	37 ...	04	...	06	...	...	4'54
19	...	22	02 ...	...	...	01	...	...	3'17
20	11	14	... ..	...	...	13	...	...	3'26
21	11	03	... 10	...	...	02	...	...	2'74
22	137	...	... ..	20	...	20	...	...	3'92
23	14	3	40 15 ...	26	...	02	...	...	4'81
24	...	3	116 15 12	01	...	...	...	...	3'73
25	...	1	04 10 03	...	...	148	...	...	2'99
26	...	3	46 06 ..	...	06	40	04	...	4'74
27	...	1	01 26 ...	...	04	02	...	...	3'95
28	...	...	01 ...	...	23	...	16	60	4'09
29	...	...	22 ...	01	12	...	...	...	2'75
30	...	8	... ..	...	...	...	...	...	4'49
31	...	4	... 01 ..	85	13	...	...	02	2'94
Sums	2'07	1	2'82	2'6850	2'37	1'30	4'00	1'32	0'80	102'19

cultural Society at Chiswick.

1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	SCMS
...	...	·02	...	...	·05	...	...	·08	...	...	·02	3·16
...	...	·01	·03	·08	...	...	·49	·04	...	...	·08	5·17
...	·16	·04	·01	...	...	..	·42	...	...	...	·34	4·52
...	...	...	...	...	·17	...	...	...	...	...	·10	3·24
...	·01	·19	...	...	·14	...	...	...	·32	...	...	3·45
...	·01	·08	...	·06	·04	...	·04	·43	·39	...	...	3·53
...	·21	...	·13	·18	...	...	·05	·16	·28	·12	·20	3·77
...	·22	·36	·18	·12	...	...	...	·09	·03	...	·06	2·67
...	·19	...	·02	...	...	·56	...	·11	...	...	·04	2·48
·12	·03	·72	...	...	...	...	1·08	·08	...	...	...	4·39
...	...	·04	...	...	...	...	·05	·32	...	·22	...	4·06
...	...	·02	·01	...	...	...	·02	·10	...	...	·22	1·62
...	...	...	...	·34	...	...	·06	·07	...	...	·20	5·53
·79	·42	·14	...	·12	...	...	·16	·01	·18	...	·02	5·24
·01	...	·10	...	·37	...	...	·04	...	·27	...	...	3·01
...	·04	·03	·10	·80	·01	...	·02	·05	...	·28	·04	3·71
...	·01	·04	...	·31	·12	...	·08	...	...	·62	...	6·05
·01	...	·29	...	...	·03	...	·04	...	...	·46	...	2·48
...	...	·06	...	...	·12	...	...	·08	·81	·26	...	2·88
...	...	...	...	·02	·01	·02	·26	·02	...	...	...	2·05
·36	...	·36	...	...	...	·48	...	...	...	...	...	3·47
...	...	·03	·02	...	·02	·22	...	...	...	·36	...	3·30
...	...	·45	...	...	...	·16	·82	·06	...	...	...	4·24
...	...	·24	...	...	...	...	...	...	...	...	...	1·73
...	·62	·48	...	...	·35	...	...	...	...	...	...	3·21
...	...	·20	...	...	·54	...	...	·01	·14	·05	...	2·48
...	·20	·01	...	...	·08	...	...	...	...	...	...	3·21
...	·01	·22	...	...	·12	...	·01	·06	...	...	...	1·58
·16	·16	·03	...	...	...	...	...	·90	·13	...	...	2·95
·01	·20	...	...	...	·04	·01	...	·02	...	...	...	2·66
...	...	...	...	...	·12	·14	...	...	...	...	...	3·99
1·46	2·49	4·16	0·50	2·40	1·96	1·59	3·64	2·69	2·55	2·37	1·32	105·83

at the Gardens of the Ro

DAY OF THE MONTH										SUMS
	1850	1851	1852	1853	1854	1855	1867	1868	1869	
1	01	10	01	80	...	...	...	...	...	4'01
2	...	...	...	44	...	...	20	...	...	2'78
3	...	...	...	...	...	02	22	...	...	3'28
4	...	01	...	...	...	01	10	...	...	2'61
5	...	...	02	...	...	...	02	...	20	1'69
6	...	...	82	...	...	...	12	...	30	5'37
7	...	...	48	...	...	...	...	...	...	2'79
8	...	...	14	...	...	...	...	...	...	4'64
9	...	...	09	12	...	...	82	...	42	5'89
10	...	...	10	01	...	...	30	...	24	4'27
11	...	...	...	...	...	...	21	...	70	3'35
12	...	...	...	03	03	20	...	...	14	2'56
13	...	...	...	07	08	...	...	...	24	2'46
14	...	...	07	...	28	82	04	...	18	3'47
15	...	...	11	19	02	...	...	...	02	2'77
16	...	...	...	04	02	04	...	...	06	3'06
17	...	...	...	...	...	06	08	...	06	4'00
18	...	...	84	...	05	...	...	42	82	4'79
19	02	...	03	...	02	...	...	04	...	3'16
20	10	02	23	...	04	...	...	02	...	2'62
21	50	...	01	...	...	...	18	...	...	3'61
22	06	...	...	08	03	...	06	...	...	3'20
23	04	08	...	...	...	...	01	...	...	3'63
24	2	...	01	14	...	...	...	...	...	4'09
25	2	06	01	02	...	...	...	28	...	1'87
26	2	...	...	...	...	...	...	42	...	6'09
27	28	01	63	...	...	...	...	01	...	4'82
28	28	...	29	02	...	32	...	26	...	6'19
29	29	...	02	25	...	08	...	18	02	3'65
30	29	...	...	...	...	...	...	...	...	...
31	1	14	18	20	01	10	...	25	82	3'26
Sum	86	0'42	3'54	2'41	0'58	1'15	1'31	1'88	3'72	109'98

Cultural Society at Chiswick.

1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	Sum
...	...	...	·14	·02	·18	·02	...	...	...	...	·04	3'35
...	...	...	...	·02	·08	...	...	...	...	...	·24	2'28
...	...	...	...	...	...	...	...	...	...	...	...	3'16
·07	...	...	...	...	·01	...	...	...	...	·52	...	4'36
·18	...	...	·08	...	·03	...	...	·01	...	...	...	3'89
·01	...	...	·05	·05	...	...	...	...	·15	...	...	3'78
·24	·18	...	·01	...	·20	...	·06	...	·04	...	...	3'40
...	·10	·01	·01	...	·01	...	·14	...	·01	...	...	3'71
...	·21	·01	·02	...	·06	·08	·79	...	·30	...	...	3'79
·09	·04	·36	·18	·60	·03	...	·58	...	...	...	...	5'32
...	·05	·16	·11	·15	...	...	·10	...	·15	...	...	2'79
·02	·10	·10	...	·17	·04	...	...	...	·02	...	·12	3'28
·05	·01	·06	...	·04	·07	...	...	·06	·05	...	...	1'25
...	...	·01	...	...	·02	...	·04	...	·04	...	...	2'57
...	·14	·28	...	·05	·14	·06	...	...	·20	...	...	4'35
...	·84	·29	·01	...	·01	·02	·58	...	...	·16	·20	3'91
·22	·01	·01	...	·16	...	·06	...	·14	·04	...	·04	1'78
·10	...	·18	...	·70	...	...	·78	·78	·08	...	·37	5'58
·14	·03	·01	...	·55	·01	·08	·18	...	·01	...	...	2'38
...	·06	...	...	...	·02	·28	·12	·02	...	·20	...	2'91
...	...	...	·06	·12	...	·30	·20	...	...	...	...	3'15
...	...	...	·28	·06	...	·01	·80	·30	...	...	...	6'33
...	...	·04	·02	...	...	...	·04	·01	...	·08	·08	4'48
...	...	·01	...	·01	...	...	·10	·42	...	·48	...	4'79
...	·80	·04	...	·08	...	...	·13	·12	...	·15	...	5'58
...	·04	·02	...	·05	...	·59	·72	·01	...	...	...	3'35
...	...	...	...	·03	...	·02	·07	·06	·17	...	...	4'90
·24	·20	·01	...	·07	·14	...	·04	·01	·02	·34	...	4'72
...	...	...	...	·02	·10	...	·12	...	·01	...	·06	2'79
...	·24	...	...	·05	·46	...	·53	·06	·06	...	·02	4'58
...	...	...	·12	...	...	...	·13	...	·06	...	...	3'25
1'36	2'55	1'60	1'04	3'00	1'56	1'42	6'25	2'00	1'41	1'93	1'17	115'76

at the Ga

DAY OF THE MONTH	2.									SUMS
	1826	1850	1851	1852	1865	1866	1867	1868	1869	
1	·06	·07	·02	·0	·02	·04	...	·08	...	2·68
2	...	...	·01	·6	·26	·01	...	...	...	3·09
3	·82	·02	·06	·1	...	·03	...	...	·08	2·72
4	·44	·05	·02	·0	...	·02	...	·20	...	2·46
5	·23	...	·02	·0	...	...	...	...	·20	3·27
6	·03	...	...	·0	...	...	...	...	...	2·99
7	...	·02	...	·1	·06	·01	...	...	...	2·32
8	...	·01	·07	..	...	·30	...	...	...	2·97
9	...	...	·14	..	·01	...	...	...	·04	1·70
10	·05	...	·01	·0	...	·31	...	·01	...	3·96
11	...	...	...	1·0	...	...	...	...	...	3·09
12	...	...	·02	·1	...	·06	...	...	...	1·97
13	·66	...	...	·2	...	·14	...	...	...	4·61
14	...	...	...	1·2	...	...	·08	·02	...	4·22
15	...	...	...	·8	·04	·02	...	...	·14	1·99
16	·15	·06	...	·1	·08	...	...	...	...	2·02
17	...	·04	...	·1	·24	...	...	...	...	2·67
18	·06	·56	...	..	...	·14	...	...	...	2·88
19	·08	·06	...	·24	·25	...	...	...	...	2·48
20	...	·12	...	·3	·10	...	...	...	...	1·60
21	...	·01	...	·1	·10	...	...	·40	·02	4·43
22	...	·22	...	·04	·13	·04	...	·28	·26	3·50
23	·06	·28	·18	·18	...	·01	...	...	...	3·06
24	...	·46	...	...	·01	·01	...	...	...	2·93
25	...	·04	...	·22	·07	...	...	·08	...	2·46
26	...	·02	...	·70	·04	·01	·02	...	...	3·90
27	...	·01	...	...	·08	·01	...	...	1·04	4·18
28	·26	...	...	·08	·29	...	...	...	...	5·17
29	·04	...	...	...	·02	...	...	...	·40	4·58
30	...	...	...	...	...	...	·29	...	...	2·63
Sums	2·86	2·03	0·55	6·20	1·70	1·16	0·39	1·07	2·18	92·53

orticultural Society at Chiswick.

57	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	Sum
2	·02	·02	·01	...	...	·25	...	·02	·20	·80	·02	...	1·97
..	·02	...	·01	...	...	·63	·02	...	·08	...	...	...	2·73
4	·01	·01	·12	...	·03	...	·02	·02	·10	...	·06	...	1·38
..	...	·26	·07	...	·01	...	...	...	·14	·10	·14	...	2·28
..	...	·12	·02	...	·05	·07	...	...	·48	·10	·04	...	2·34
2	·01	·26	·06	·46	·17	...	...	...	·16	·14	·28	...	2·90
..	...	...	·11	...	·16	...	·02	·22	...	...	·36	...	3·42
..	·01	...	·34	·23	...	·05	·06	...	...	...	·14	...	2·64
..	...	...	...	...	·34	·08	...	...	·06	...	...	...	2·05
..	...	...	...	·01	...	...	...	...	·02	...	·02	...	0·91
..	...	...	...	·06	·18	...	...	...	·12	...	...	·30	2·32
..	·10	...	·01	·04	...	...	·02	...	·04	...	...	·04	1·87
..	...	...	...	·06	·14	...	·02	...	·20	...	...	·02	1·15
..	...	...	...	...	...	...	...	...	...	·06	·12	·30	1·75
..	·01	...	·02	·07	...	...	...	...	·15	·16	·36	...	3·16
0	...	...	·04	...	...	...	...	...	·01	...	·10	·60	3·18
..	...	...	·01	...	·08	...	...	...	·01	·04	·22	·06	2·08
4	·62	...	...	...	...	...	...	...	...	...	·20	·06	3·07
..	·09	...	...	...	...	...	...	...	...	...	...	...	2·15
7	·04	...	...	...	...	...	·10	·01	...	...	·16	·30	2·16
1	·03	...	...	...	·01	·05	...	...	...	·12	·14	·40	1·62
..	·01	...	...	...	·11	·02	...	...	·01	...	·38	...	2·68
..	·04	·25	·02	...	·01	...	...	...	...	...	·32	...	2·95
..	·01	·08	...	...	·01	...	...	...	·01	...	·02	...	1·42
..	·25	·45	...	...	...	...	...	...	...	...	...	...	1·24
..	·17	...	...	...	...	·03	...	·01	·10	...	·54	...	2·51
..	·05	·10	·13	...	...	...	...	...	...	...	·04	...	1·63
..	·02	·21	...	...	...	...	...	·16	...	...	·04	...	1·13
..	...	·08	·62	...	·18	...	...	·11	·04	...	·60	...	2·44
..	·01	·09	·18	·01	·01	...	...	·08	...	...	·56	...	1·70
..	·01	·02	·26	...	...	·13	·08	·29	...	...	...	·36	2·45
0	1·53	1·95	2·03	0·94	1·49	1·26	0·34	0·92	1·93	1·02	4·86	2·44	67·28

A glance at these Tables shows in every month the periods of long-continued absence of rain, and of long periods of continuous rain.

The following are instances of very little or no rain for a fortnight together or more :—

In January,	1826, 1827, 1829, 1830, 1838, 1850, 1861.
„ February,	1827, 1855, 1858, 1862.
„ March,	1828, 1829, 1847, 1850, 1858.
„ April,	1826, 1834, 1840, 1842, 1852, 1855, 1861, 1863, 1864.
„ May,	1829, 1833, 1834, 1836, 1838, 1848, 1866.
„ June,	1826, 1835, 1842, 1846, 1849, 1865, 1867, 1868.
„ July,	1827, 1832, 1835, 1860, 1863, 1866, 1869.
„ August,	1826, 1833, 1834, 1835, 1853, 1857, 1864, 1869.
„ September,	1832, 1846, 1850, 1851, 1865, 1868.
„ October,	1828, 1842, 1845, 1868.
„ November,	1844, 1851, 1858, 1859, 1862, 1867.
„ December,	1829, 1834, 1835, 1838, 1840, 1844, 1851, 1853, 1855, 1859, 1861, 1864, 1865.

Thus there have been in the forty-four years—

7 such instances in January.			7 such instances in July.		
4	„	February.	8	„	August.
5	„	March.	6	„	September.
9	„	April.	4	„	October.
7	„	May.	6	„	November.
8	„	June.	13	„	December.

The month in which long periods without rain have been most frequent is December, and those in which long periods have been least frequent are February and October.

The longest intervals without rain in each month are as follows :—

In January,	1838	26 days.
„ February,	1827	24 „
„ March,	1829	27 „
„ April,	1834	24 „
„ May,	1833	28 „
„ June,	1865	24 „
„ July,	1869	27 „
„ August,	1864	19 „
„ September,	1865	19 „
„ October,	1842	17 „
„ November,	1867	25 „
„ December,	1829	28 „

Of periods of 14 days or more without rain running from one month into another, and therefore in addition to the above instances, there are 24; the largest of these is 32 days in 1846, May 21 to June 21; the next in order is 30 days in 1826, June 8 to July 7, and 1850, February 21 to March 22.

The following are instances of long-continued rain, or rain falling every day for a fortnight together :—

In January,	1834 and 1846.
„ February,	1833.
„ March,	1836.
„ April,	1829 and 1867.
„ May,	1843.
„ June,	1852, 1860, 1862.
„ July,	1867.
„ August,	1832 and 1860.
„ September,	1829, 1830, 1835, 1860, and 1866.
„ October,	1836, 1841, 1846, 1848, 1855, 1865.
„ November,	1842, 1852.
„ December,	1827, 1833.

Thus, once only in the four months of February, March, May, and July has rain fallen consecutively for so long a period as 14 days. Of the remaining months there are five distinguished by two such cases in 44 years, viz., January, April, August, November, and December, and there are three such cases in June, five in September, and six in October.

Of other instances of 14 days or more of continuous rain running from one month into the next, there are seven cases, viz., in 1836, March 22 to April 9; 1843, May 14 to June 10; 1836, September 27 to October 15; 1841, September 21 to October 18; 1855, September 28 to October 17; 1840, October 26 to November 13; and 1841, November 26 to December 13. Of these the longest continuous rain was 28 days.

In looking over Tables I. to XII. it will be seen how, as a rule, the rain falls in gentle showers, and but seldom as very heavy rain. Falls of an inch in the day in the winter months are very unusual; in the 44 years there has been but one such fall in the months of January, March, and December, and there has not been a single instance in the month of *February*. The greatest fall in this month on one day was on the 25th day in the year 1849, when the amount was 0·92 inch. All the instances of an inch of rain in the day in the 44 years are as follows:—

	In.		In.
January 11, 1866	1·00	July 15, 1841	1·46
March 20, 1862	1·11	„ 24, 1849	1·16
April 2, 1830	1·19	„ 1, 1851	1·18
„ 25, 1846	1·40	„ 16, 1852	1·60
May 13, 1835	1·10	„ 11, 1855	1·07
„ 5, 1843	1·26	„ 26, 1855	1·22
„ 12, 1860	1·14	„ 28, 1860	1·39
June 26, 1835	1·00	„ 25, 1867	1·48
„ 9, 1852	1·48	August 13, 1828	1·14
„ 4, 1866	1·02	„ 10, 1842	1·06
July 22, 1826	1·37	„ 3, 1843	1·03
„ 24, 1829	1·03	„ 1, 1846	1·23
„ 12, 1831	1·10	„ 31, 1848	1·31
„ 18, 1834	1·22	„ 27, 1851	1·32
„ 29, 1834	1·31	„ 17, 1856	1·12

		In.			In.
August	10, 1865	1·08	October	3, 1849	1·01
September	9, 1827	1·09	"	4, 1852	1·06
"	10, 1828	1·27	"	22, 1857	1·96
"	1, 1831	1·50	November	7, 1833	1·02
"	23, 1846	1·21	"	28, 1838	1·21
"	26, 1859	1·68	"	14, 1852	1·24
"	28, 1862	1·44	"	13, 1861	1·16
October	28, 1827	1·06	"	27, 1869	1·04
"	12, 1831	1·00	December	23, 1833	1·13
"	15, 1844	1·04			

Thus there are two instances in April; three in May; three in June; thirteen in July; eight in August; six in September; six in October; and five in November.

The heaviest fall of all is 1·96 in. in *October, 1857.*

By taking the sums of all the numbers in Tables I. to XII., month by month, Table XIII. was formed, showing the monthly fall of rain for 44 years; and by taking the sums of all the numbers, day by day, Table XIV. was formed, showing the sums of every fall of rain on every day of the year for 44 years: and by taking the sums of the numbers in Tables XIII. and XIV. the accuracy of all this work is proved.

By looking over Table XIII. month by month we see that—

In				In.
In January,	1855, the fall of rain in the month was as small as			0·10
" "	1866, " "			large as 3·72
" February,	1832, " "			small as 0·23
" "	1833, " "			large as 3·98
" March,	1850, " "			small as 0·13
" "	1862, " "			large as 3·74
" April,	1840, " "			small as 0·06
" "	1829, " "			large as 4·49
" May	1844, " "			small as 0·25
" "	1843, " "			large as 5·26
" June,	1849, " "			small as 0·31
" "	1860, " "			large as 5·15
" July,	1864, " "			small as 0·50
" "	1834, " "			large as 6·34
" August,	1835, " "			small as 0·18
" "	1846, " "			large as 4·50
" September,	1851, " "			small as 0·42
" "	1835, " "			large as 4·60
" October,	1834, " "			small as 0·43
" "	1865, " "			large as 6·25
" November,	1858, " "			small as 0·10
" "	1852, " "			large as 6·20
" December,	1829, " "			small as 0·15
" "	1868, " "			large as 4·86

Therefore, the smallest monthly fall of rain, viz., 0·06 in., took place in April, 1840, and the largest, 6·34 in., in July, 1834.

TABLE XIII.

Showing the Monthly Fall of Rain in Forty-four Years (1826-1869 inclusive).

Year	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	Sums
1826	0.27	1.71	1.62	0.88	2.39	0.38	2.07	2.00	3.71	2.14	2.89	1.77	21.83
1827	0.75	0.79	2.50	0.71	2.24	0.82	1.31	1.66	3.37	4.06	1.06	3.09	22.36
1828	3.71	0.94	0.59	2.44	1.40	1.94	4.38	4.35	4.03	1.18	1.12	1.77	27.85
1829	0.30	1.07	0.75	4.49	0.52	2.37	6.23	4.07	3.71	1.60	1.86	0.15	26.12
1830	1.54	1.31	0.18	2.84	2.47	2.62	1.46	3.05	3.21	0.98	3.05	1.54	24.25
1831	1.02	2.27	1.91	1.96	2.21	1.37	2.52	1.59	4.19	3.81	1.70	2.38	26.93
1832	1.32	0.23	1.50	0.95	2.16	2.89	0.89	3.62	1.12	3.09	1.94	1.88	21.59
1833	0.52	3.98	1.22	2.71	0.68	2.63	1.56	1.93	1.55	2.37	2.38	4.29	25.82
1834	2.87	0.37	0.86	0.65	1.19	1.63	6.34	2.73	0.83	0.43	1.75	0.74	20.39
1835	0.72	2.61	1.97	1.06	3.38	1.99	0.41	0.18	4.60	4.05	1.94	0.25	23.16
1836	2.01	1.61	3.30	2.88	1.07	1.66	1.78	1.97	3.81	3.62	3.60	1.48	28.73
1837	3.03	2.01	0.54	1.13	1.07	1.31	1.78	3.04	0.91	2.39	1.32	1.35	19.88
1838	0.27	2.22	0.86	0.52	0.92	3.65	2.19	1.23	2.08	2.36	3.55	1.72	21.57
1839	1.27	2.19	1.68	1.46	0.82	3.00	2.92	1.85	3.92	2.23	4.27	2.32	27.93
1840	2.48	1.25	0.28	0.06	2.18	1.48	1.68	1.62	2.45	1.85	3.59	0.45	18.87
1841	2.60	0.76	1.32	1.58	2.16	2.45	3.56	2.69	3.71	4.61	3.41	2.12	30.97
1842	1.06	1.32	1.81	0.15	1.73	1.68	1.52	2.81	3.39	1.71	4.43	0.76	22.27
1843	1.23	2.35	0.47	1.62	5.20	1.02	1.67	3.28	0.98	4.19	2.13	0.68	25.48
1844	2.26	2.27	2.44	0.33	0.25	0.97	2.10	1.41	1.41	4.12	3.06	0.39	31.14

1845	2.97	0.92	1.25	0.95	2.89	1.36	2.31	2.79	1.77	1.89	2.11	2.61	23.33
1846	2.85	1.47	1.09	3.93	1.35	0.80	1.78	4.50	1.76	5.54	1.43	1.21	27.71
1847	1.31	1.34	0.41	0.92	1.59	1.31	0.79	1.50	1.66	1.75	2.26	1.81	16.65
1848	1.16	3.12	3.05	3.06	0.28	3.20	2.21	4.70	2.20	2.93	0.90	2.03	28.84
1849	1.73	2.52	0.85	2.21	3.53	0.31	2.32	1.60	2.49	2.18	1.32	1.28	22.84
1850	1.43	0.95	0.13	1.79	1.84	1.40	2.68	0.97	2.36	1.55	2.03	1.15	18.28
1851	3.07	0.90	3.57	1.65	0.74	1.33	3.90	2.03	0.42	2.01	0.55	0.62	20.79
1852	2.72	1.06	0.25	0.52	1.74	4.69	2.28	3.71	3.54	3.87	6.20	1.97	32.55
1853	2.14	0.59	1.48	2.58	1.60	2.54	4.17	1.87	2.41	3.78	0.91	0.30	24.37
1854	1.92	0.78	0.42	0.30	4.03	1.53	2.40	1.77	0.58	2.61	1.31	1.27	18.92
1855	0.10	1.35	1.75	0.26	1.94	1.48	6.30	1.45	1.15	6.15	1.34	1.11	24.38
1856	1.76	0.62	0.97	1.97	4.38	0.88	1.43	3.50	1.99	2.40	0.94	1.88	22.72
1857	2.09	0.31	0.73	1.77	0.87	1.91	1.22	2.80	3.52	4.01	1.53	0.30	21.06
1858	0.41	1.48	0.98	2.13	2.05	0.78	2.55	1.46	1.05	1.36	0.10	1.53	15.78
1859	0.61	1.29	0.77	2.01	1.80	3.10	2.18	2.49	4.05	2.55	2.72	1.95	25.52
1860	2.18	1.20	1.63	0.95	3.04	5.15	2.72	4.16	2.82	1.60	2.60	2.03	30.58
1861	0.32	1.41	1.89	1.44	1.31	2.35	1.90	0.50	1.78	1.04	4.10	0.94	19.48
1862	1.53	0.38	3.74	2.29	3.54	2.33	2.09	2.40	2.74	3.00	1.01	1.49	26.54
1863	2.19	0.26	0.68	0.54	1.46	4.46	0.80	1.96	3.47	1.56	1.68	1.26	20.32
1864	0.57	0.76	2.53	0.77	1.95	1.70	0.50	1.59	2.81	1.42	1.94	0.34	16.38
1865	3.50	1.63	0.95	0.35	3.19	1.84	2.37	3.64	0.58	6.25	1.70	0.92	26.92
1866	3.72	3.80	1.65	1.98	1.17	3.60	1.30	2.69	4.04	2.00	1.16	1.93	29.04
1867	2.16	1.33	1.97	1.67	2.05	1.37	4.00	2.55	2.81	1.41	0.39	1.02	22.33
1868	1.64	0.95	0.93	0.93	1.05	0.33	1.32	2.37	1.88	1.93	1.07	4.86	19.26
1869	1.98	1.98	0.86	1.22	2.76	1.26	0.80	1.32	3.72	1.17	2.18	2.44	21.69
Sums	75.88	63.67	60.23	66.61	86.19	87.37	102.19	105.83	109.98	115.76	92.53	67.28	
Means	1.72	1.45	1.37	1.51	1.96	1.99	2.32	2.41	2.50	2.63	2.10	1.53	23.49

TABLE XIV.

*Showing the sums of every Fall of Rain in every Day of the Year in Forty-four Years
(1826-69 inclusive).*

DAY OF THE MONTH	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	1.75	2.20	2.31	2.56	1.62	2.12	4.09	3.16	4.01	3.35	2.68	1.97
2	1.01	2.85	2.23	3.42	1.79	3.82	1.04	5.17	2.78	2.28	3.09	2.73
3	2.50	2.63	2.42	1.89	2.65	3.02	3.38	4.52	3.28	3.16	2.72	1.38
4	2.33	2.86	1.51	2.30	2.45	2.66	1.47	3.24	2.61	4.36	2.46	2.28
5	2.46	2.49	2.21	2.58	4.36	4.76	2.54	3.45	1.69	3.89	3.27	2.34
6	2.05	0.88	1.65	1.29	3.53	1.56	2.89	3.53	5.37	3.78	2.99	2.90
7	2.74	2.40	1.44	2.54	3.40	2.44	2.38	3.77	2.79	3.40	2.32	3.42
8	0.86	2.74	1.06	2.81	3.33	1.20	2.81	2.67	4.64	3.71	2.97	2.64
9	2.17	2.21	1.97	2.81	3.76	4.06	2.99	2.48	5.89	3.79	1.70	2.05
10	1.85	1.95	2.11	1.17	2.44	2.65	2.40	4.39	4.27	5.32	3.96	0.91
11	4.50	2.76	1.90	2.11	2.39	1.97	3.62	4.06	3.35	2.79	3.09	2.32
12	4.80	1.73	1.79	2.84	3.96	4.83	2.98	1.62	2.56	3.28	1.97	1.87
13	2.86	1.60	2.33	1.69	2.83	4.20	3.24	5.53	2.46	1.25	4.61	1.15
14	2.61	1.99	3.89	1.82	2.29	2.76	2.68	5.24	3.47	2.67	4.22	1.75

15	1.80	1.96	1.72	1.93	2.52	2.85	4.73	3.01	2.77	4.35	1.99	3.16
16	2.23	1.21	2.85	2.75	1.49	2.14	3.65	3.71	3.06	3.91	2.02	3.18
17	1.40	1.91	2.02	1.47	2.33	3.48	3.18	6.05	4.00	1.78	2.67	2.08
18	2.96	1.28	0.95	1.93	1.48	2.92	4.54	2.48	4.79	5.58	2.88	3.07
19	3.72	2.32	1.37	1.08	2.54	3.17	3.17	2.88	3.16	2.38	2.48	2.15
20	2.79	2.94	3.32	2.23	3.56	2.20	3.26	2.05	2.62	2.91	1.60	2.16
21	2.77	1.80	1.34	1.38	2.77	4.09	2.74	3.47	3.61	3.15	4.43	1.62
22	1.87	1.53	1.44	2.58	1.58	2.30	3.92	3.30	3.20	6.33	3.50	2.68
23	1.50	2.14	2.47	3.41	2.39	2.24	4.81	4.24	3.63	4.48	3.06	2.95
24	2.84	2.88	0.90	2.90	2.88	2.78	3.73	1.73	4.09	4.79	2.93	1.42
25	2.57	2.64	2.00	3.98	2.41	3.94	2.99	3.21	1.87	5.58	2.46	1.24
26	2.34	4.18	0.84	1.20	2.76	3.93	4.74	2.48	6.09	3.35	3.90	2.51
27	2.42	1.90	1.77	2.33	3.44	2.34	3.95	3.21	4.82	4.90	4.18	1.63
28	2.07	2.66	2.83	2.33	3.99	3.03	4.09	1.58	6.19	4.72	5.17	1.13
29	1.80	(0.93)	1.35	2.59	4.18	1.30	2.75	2.95	3.65	2.79	4.58	2.44
30	3.40		2.07	1.19	1.55	3.11	4.49	2.66	3.26	4.58	2.63	1.70
31	2.91		2.17		2.99		2.94	3.99		3.25		2.45
Sums	75.88	63.67	60.23	66.61	86.19	87.37	102.19	105.83	109.98	115.76	92.53	67.28
Means	2.45	2.24	1.94	22.2	2.78	2.91	3.30	3.41	3.67	3.73	3.08	2.17

By taking the means of the numbers in each month for all the years, the average fall of rain for each month is as follows:—

	<i>At Chiswick.</i>							<i>At Greenwich.</i>						
	In.							In.						
January	1·70	.	.	.	.	.	.	1·87						
February	1·45	.	.	.	.	.	.	1·57						
March	1·37	.	.	.	.	.	.	1·59						
April	1·51	.	.	.	.	.	.	1·73						
May	1·96	.	.	.	.	.	.	2·17						
June	1·99	.	.	.	.	.	.	1·94						
July	2·32	.	.	.	.	.	.	2·56						
August	2·41	.	.	.	.	.	.	2·39						
September	2·50	.	.	.	.	.	.	2·43						
October	2·63	.	.	.	.	.	.	2·77						
November	2·10	.	.	.	.	.	.	2·36						
December	1·53	.	.	.	.	.	.	1·96						

Greenwich averages are for fifty-five years, viz. 1815–1869.

The following Table shows the yearly fall of rain in each year in the period 1826–1869 at Chiswick and at Greenwich for the same years:—

<i>Year.</i>	<i>Chiswick.</i>							<i>Greenwich.</i>						
	In.							In.						
1826	21·8	.	.	.	.	.	.	23·0						
1827	22·4	.	.	.	.	.	.	24·9						
1828	27·9	.	.	.	.	.	.	31·5						
1829	26·1	.	.	.	.	.	.	25·2						
1830	24·3	.	.	.	.	.	.	27·2						
1831	26·9	.	.	.	.	.	.	30·8						
1832	21·6	.	.	.	.	.	.	19·3						
1833	25·8	.	.	.	.	.	.	23·0						
1834	20·4	.	.	.	.	.	.	19·6						
1835	23·2	.	.	.	.	.	.	24·9						
1836	28·7	.	.	.	.	.	.	27·1						
1837	19·9	.	.	.	.	.	.	21·0						
1838	21·6	.	.	.	.	.	.	23·8						
1839	27·9	.	.	.	.	.	.	29·6						
1840	18·9	.	.	.	.	.	.	18·3						
1841	31·0	.	.	.	.	.	.	33·3						
1842	22·3	.	.	.	.	.	.	22·6						
1843	25·5	.	.	.	.	.	.	24·6						
1844	21·3	.	.	.	.	.	.	24·9						
1845	23·3	.	.	.	.	.	.	22·4						
1846	27·7	.	.	.	.	.	.	25·3						
1847	16·7	.	.	.	.	.	.	17·8						
1848	28·8	.	.	.	.	.	.	30·2						
1849	22·8	.	.	.	.	.	.	23·7						
1850	18·3	.	.	.	.	.	.	19·7						
1851	20·8	.	.	.	.	.	.	22·7						
1852	32·6	.	.	.	.	.	.	34·2						

<i>Year.</i>	<i>Chiswick.</i>	<i>Greenwich.</i>
	In.	In.
1853 . . .	24·4 . . .	29·0
1854 . . .	18·9 . . .	18·7
1855 . . .	24·4 . . .	21·1
1856 . . .	22·7 . . .	22·2
1857 . . .	21·1 . . .	21·4
1858 . . .	15·8 . . .	17·8
1859 . . .	25·5 . . .	25·9
1860 . . .	30·1 . . .	32·0
1861 . . .	19·5 . . .	20·3
1862 . . .	26·5 . . .	26·5
1863 . . .	20·3 . . .	19·8
1864 . . .	16·9 . . .	16·8
1865 . . .	26·9 . . .	28·6
1866 . . .	29·0 . . .	30·1
1867 . . .	22·2 . . .	28·5
1868 . . .	19·3 . . .	25·2
1869 . . .	21·7 . . .	24·0

The years distinguished by the smallest annual fall of rain, both at Chiswick and Greenwich, are 1847, and 1864. The least annual rainfall at Chiswick was 15·8 inches, the year 1858. The greatest annual rainfall at Chiswick was 32·6 inches, the year 1852. By comparing the falls of rain at Chiswick and Greenwich together, year by year, we see that generally the fall at Greenwich is the greater in amount, and this excess at times has continued for several years together. These instances are:—

	In.
From 1826 to 1828, the excess in 3 years was	7·3
„ 1837 to 1839, „ 3 years was	5·0
„ 1847 to 1853, „ 7 years was	12·9
„ 1857 to 1861, „ 5 years was	5·4
„ 1865 to 1869, „ 5 years was	17·3

There is reason to fear that the rainfall at Chiswick in the last three or four years has been somewhat too small in amount.

At times, however, it has been greater at Chiswick than at Greenwich. These instances are:—

The year 1829.

„ years 1832, 1833, and 1834.

„ years 1836, 1840, 1843, 1845, 1846, 1854, 1855, 1856, 1863, and 1864.

One year the amounts were the same, viz., in 1862. There are twenty-nine instances of Greenwich being in excess; and fourteen of Chiswick being in excess.

The mean at Chiswick is 23·5 inches,
and „ Greenwich is 24·5 inches,

as the annual fall of rain, as found from the observations 1826 to 1869.

By comparing the numbers in Table XIV. month by month we see that:—

			In.				In.
In January the sums vary from			0·86	on the 8th to			4·80 on the 12th
„ February	„	„	0·88	„	6th	„	4·18 „ 26th
„ March	„	„	0·84	„	26th	„	3·89 „ 14th
„ April	„	„	1·08	„	19th	„	3·98 „ 25th
„ May	„	„	1·48	„	18th	„	4·36 „ 5th
„ June	„	„	1·20	„	8th	„	4·83 „ 12th
„ July	„	„	1·04	„	2nd	„	4·81 „ 23rd
„ August	„	„	1·58	„	28th	„	6·05 „ 17th
„ September	„	„	1·69	„	5th	„	6·19 „ 28th
„ October	„	„	1·25	„	13th	„	6·33 „ 22nd
„ November	„	„	1·60	„	20th	„	5·17 „ 28th
„ December	„	„	0·91	„	10th	„	3·42 „ 7th

By taking the differences between these extremes in each month, we find that the smallest difference is in December, viz., 2·51 in., and the largest in October, viz., 5·08 in.

By comparing the consecutive numbers in Table XIV. together very large differences are found, the largest of these in each month are as follows:—

						In.
In January between the 10th and 11th days, the difference is						2·65
„ February	„	26th	„	27th	„	2·28
„ March	„	14th	„	15th	„	2·17
„ April	„	25th	„	26th	„	2·78
„ May	„	29th	„	30th	„	2·63
„ June	„	5th	„	6th	„	3·20
„ July	„	1st	„	2nd	„	3·05
„ August	„	12th	„	13th	„	3·91
„ September	„	25th	„	26th	„	4·22
„ October	„	17th	„	18th	„	3·80
„ November	„	20th	„	21st	„	2·83
„ December	„	23rd	„	24th	„	1·53

By comparing the amounts of the falls at different periods of the year, it is at once seen that the heaviest take place in the months of May to November, and the lightest in the early months of the year. The day in the year distinguished by the smallest fall is March 26, with 0·84 in. for 44 years, the next in order being January 8 and February 6. The day distinguished by the heaviest fall of the year is October 22, with 6·33 in. as the sum for 44 years; the next in order are September 28 and September 26, with 6·19 in. and 6·09 in. respectively.

By taking the sums of the numbers in Table XIV. in five-day periods

Table XV. was formed. On looking over this Table, we still find considerable differences in every month of the year, and that the sum of five-day periods vary.

In.			In.		
In January	from	9·67	6th to 10th,	to	16·57
„ February	„	8·68	15th „ 19th,	„	13·69
„ March	„	7·65	22nd „ 26th,	„	12·58
„ April	„	9·46	18th „ 20th,	„	14·25
„ May	„	11·40	16th „ 20th,	„	16·96
„ June	„	13·61	20th „ 24th,	„	16·41
„ July	„	13·09	June 30th „ 4th,	„	19·27
„ August	„	12·21	24th „ 28th,	„	20·49
„ September	„	15·74	3rd „ 7th,	„	20·71
„ October	„	13·86	13th „ 17th,	„	23·10
„ November	„	14·04	7th „ 11th,	„	18·53
„ December	„	9·35	27th „ 31st,	„	11·63
				2nd „	6th

TABLE XV.

Showing the Sum of Rainfall in Five-day Periods.

PERIODS	AMOUNTS	PERIODS	AMOUNTS	PERIODS	AMOUNTS	PERIODS	AMOUNTS
January 1-5 . . .	10.05	April 1-5 . . .	12.25	June 30 to July 4 . . .	13.09	Sept. 28 to Oct. 2 . . .	18.73
" 6-10 . . .	9.67	" 6-10 . . .	10.62	July 5-9 . . .	13.61	October 3-7 . . .	18.59
" 11-15 . . .	16.57	" 11-15 . . .	10.39	" 10-14 . . .	14.92	" 8-12 . . .	18.89
" 16-20 . . .	13.10	" 16-20 . . .	9.46	" 15-19 . . .	19.27	" 13-17 . . .	13.86
" 21-25 . . .	11.55	" 21-25 . . .	14.25	" 20-24 . . .	18.46	" 18-22 . . .	20.35
" 26-30 . . .	12.03	" 26-30 . . .	9.64	" 25-29 . . .	18.52	" 23-27 . . .	23.10
Jan. 31 to Feb. 4 . . .	13.55	May 1-5 . . .	12.87	July 30 to August 3 . . .	20.28	Oct. 28 to Nov. 1 . . .	18.02
February 5-9 . . .	10.72	" 6-10 . . .	16.96	August 4-8 . . .	16.66	November 2-6 . . .	14.53
" 10-14 . . .	10.03	" 11-15 . . .	13.99	" 9-13 . . .	18.08	" 7-11 . . .	14.04
" 15-19 . . .	8.68	" 16-20 . . .	11.40	" 14-18 . . .	20.49	" 12-16 . . .	14.81
" 20-24 . . .	11.29	" 21-25 . . .	12.06	" 19-23 . . .	15.94	" 17-21 . . .	14.06
February 25 to March 1 . . .	13.69	" 26-30 . . .	15.92	" 24-28 . . .	12.21	" 22-26 . . .	15.85
March 2-6 . . .	10.02	May 31 to June 4 . . .	14.61	August 29 to Sept. 2 . . .	16.39	Nov. 27 to Dec 1 . . .	18.53
" 7-11 . . .	8.48	June 5-9 . . .	14.02	September 3-7 . . .	15.74	December 2-6 . . .	11.63
" 12-16 . . .	12.58	" 10-14 . . .	16.41	" 8-12 . . .	20.71	" 7-11 . . .	11.34
" 17-21 . . .	9.00	" 15-19 . . .	14.06	" 13-17 . . .	15.76	" 12-16 . . .	11.11
" 22-26 . . .	7.65	" 20-24 . . .	13.61	" 18-22 . . .	17.38	" 17-21 . . .	11.08
" 27-31 . . .	10.19	" 25-29 . . .	14.54	" 23-27 . . .	20.50	" 22-26 . . .	10.80
						" 27-31 . . .	9.35

The sums of the falls of rain in five day-periods, therefore, exhibit very considerable differences in every month; the smallest is in December, viz., 2·26 in., and the largest is in October, 9·24 in.; they are also large in January, July, and August.

The mean difference of the four months January, July, August, and October is 7·63 in., and of the remaining eight months is 4·35 in.

The five-day period distinguished by the least rain in the year is from March 22 to 26; and that by the greatest is October 23 to 27; the difference between the two amounts is 15·45 in 44 years.

By taking the numbers in Table XIV. in successive ten-day groups the next Table was formed.

TABLE XVI.

Showing the Sum of Rainfall in Ten-day Periods.

January 1-10 . . .	19·72	June 30 to July 9 . . .	26·70
„ 11-20 . . .	29·67	July 10-19 . . .	34·19
„ 21-30 . . .	23·58	„ 20-29 . . .	36·98
January 31 to February 9	24·27	July 30 to August 8 .	36·94
February 10-19 . . .	18·71	August 9 to 18 . . .	38·57
February 20 to March 1 .	24·98	„ 19-28 . . .	38·15
March 2-11 . . .	18·50	August 29 to September 7	32·13
„ 12-21 . . .	21·58	September 8-17 . . .	36·47
„ 22-31 . . .	17·84	„ 18-27 . . .	37·88
April 1-10 . . .	22·87	September 28 to October 7	37·32
„ 11-20 . . .	19·85	October 8-17 . . .	32·75
„ 21-30 . . .	23·89	„ 18-27 . . .	43·45
May 1-10 . . .	29·83	October 28 to November 6	32·55
„ 11-20 . . .	25·39	November 7-16 . . .	28·85
„ 21-30 . . .	27·98	„ 17-26 . . .	29·91
May 31 to June 9 . . .	28·63	November 27 to December 6	30·16
June 10-19 . . .	30·47	December 7-16 . . .	22·45
„ 20-29 . . .	28·15	„ 17-26 . . .	21·88

The differences between these numbers are at times great; in January the sum, in the first ten days is less than in the second by 10·0 in. From this time the differences are generally small, with the exception of that between the period ending July 9 and that ending July 19, which is 7·5 in., till between the ten-day period ending October 17 and that ending October 27, the difference being 10·7 in., and also between

the period ending October 27 and that ending November 6, the difference on this occasion being 10·9 in., this also being the largest difference in the year.

The period of least changes, generally, between consecutive ten-day periods, extends from July 19 to October 7; but the driest ten-day period, however, does not occur in this interval, it being from March 22 to 31; the next in order is March 2 to 11, and then February 10 to 19.

The wettest period of ten consecutive days in the year is from October 18 to 27. The other periods of large falls are August 9 to 18, August 19 to 28, and September 18 to 27.

It is worthy of notice that both the driest and wettest decades are coincident in date with those as found in the reduction of the Greenwich observations.

By taking the sums in fifteen-day periods the next Table was formed.

TABLE XVII.

Showing the Sum of Rainfall in Fifteen-day Periods.

January 1-15 . . .	36·29	June 30 to July 14 . .	41·62
„ 16-30 . . .	36·68	July 15-29 . . .	56·25
January 31 to February 14	34·30	July 30 to August 13 .	55·02
February 15 to March 1 .	33·66	August 14-28 . . .	48·64
March 2-16 . . .	31·08	August 29 to September 12	52·84
„ 17-31 . . .	26·84	September 13-27 . .	53·64
April 1-15 . . .	33·26	September 28 to October 12	56·21
„ 16-30 . . .	33·35	October 13-27 . . .	57·31
May 1-15 . . .	43·82	October 28 to November 11	46·59
„ 16-30 . . .	39·38	November 12-26 . .	44·72
May 31 to June 14 . .	45·04	November 27 to December 11	41·50
June 15-29 . . .	42·21	December 12-26 . . .	32·99

The differences between these numbers are occasionally large. Between the periods ending April 30 and May 15 the difference is 10·5 in.; between those ending July 14 and July 29, 14·6 in.; and between those ending October 27 and November 11, 10·7 in.

The fifteen-day period of least rain is from March 17 to 31, and the next in order is from March 2 to 16.

The period of most rain is October 13 to 27, and the next in order is July 15 to 29, and September 28 to October 12.

By taking the sums of rain in successive periods of thirty days, we find that the sum—

				In.
From January	1st to January	30th was		72·97
" "	31st " March	1st "		67·96
" March	2nd " "	31st "		67·92
" April	1st " April	30th "		66·61
" May	1st " May	30th "		83·20
" "	31st " June	29th "		87·25
" June	30th " July	29th "		97·87
" July	30th " August	28th "		103·66
" August	29th " September	27th "		106·48
" September	28th " October	27th "		113·62
" October	28th " November	26th "		91·31
" November	27th " December	26th "		74·49

From this we see that the period of thirty consecutive days of least fall of rain is from March 2 to 31, and of the greatest, from September 28 to October 27.

By taking the sums of the amounts of rain which fell on every day, in periods of sixty days, we find that the sum—

				In.
From January	1st to March	1st was		140·93
" March	2nd " April	30th "		124·53
" May	1st " June	29th "		170·45
" June	30th " August	28th "		201·53
" August	29th " October	27th "		220·00
" October	28th " December	26th "		165·80

The period of least fall of sixty days' duration was from March 2 to April 30, and of the greatest from August 29 to October 27.

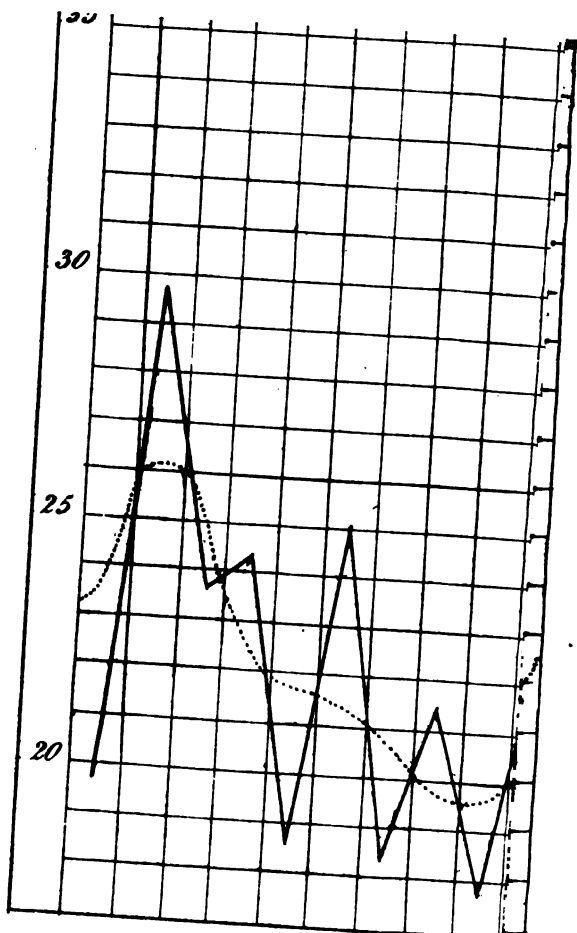
Again, by taking periods of successive ninety days, we see that the sum—

				In.
From January	1st to March	31st was		198·85
" April	1st " June	29th "		237·06
" June	30th " September	27th "		308·01
" September	28th " December	26th "		279·32

But the sum of the falls in the ninety days from January 31 to April 30, was 192·5 in., being smaller than in the period from January 1 to March 31; and the sum of the falls in the ninety days September 8 to December 6, was 309·3 in., being larger than in the ninety days June 30 to September 27.

Taking successive periods of 120 days, the sums of the falls are:—

				In.
From January	1st to April	30th was		265·46
" May	1st " August	28th "		371·98
" August	29th " December	26th "		385·80



Spottiswoode & Co Lith, London.

Note

In April	.	.	.	.	.	.	·050 inch per day
„ May	.	.	.	.	.	.	·063 „ „
„ June	.	.	.	.	.	.	·066 „ „
„ July	.	.	.	.	.	.	·075 „ „
„ August	.	.	.	.	.	.	·078 „ „
„ September	.	.	.	.	.	.	·083 „ „
„ October	.	.	.	.	.	.	·085 „ „
„ November	.	.	.	.	.	.	·070 „ „
„ December	.	.	.	.	.	.	·049 „ „

The average rainfall in the first 120 days, being those of least rain, is 0·05 in. per day; and in the period, June 30 to October 27, being those of the greatest rain, is 0·08 in. per day.

By taking the sums of the falls of rain in the several periods of least and greatest falls, and dividing the sums by the numbers as follows :—
in the

		In.		In.
5 days of least falls the sum was		7·65	or, per day,	1·53
10	„ „	17·84	„	1·78
15	„ „	26·84	„	1·79
30	„ „	57·92	„	1·93
60	„ „	124·53	„	2·08
90	„ „	198·85	„	2·21
120	„ „	265·46	„	2·21

and of

		In.		In.
5 days of greatest falls the sum was		23·10	or, per day,	4·62
10	„ „	43·45	„	4·35
15	„ „	57·31	„	3·82
30	„ „	113·52	„	3·78
60	„ „	220·00	„	3·67
90	„ „	308·01	„	3·42
120	„ „	421·53	„	3·51

If we divide the numbers in the last column by 44, we find that the average fall per day in the

		In.		In.
5 days of least rain was		·035, and of the greatest was		·105
10	„ „	·040,	„ „	·099
15	„ „	·041,	„ „	·087
30	„ „	·044,	„ „	·086
60	„ „	·047,	„ „	·083
90	„ „	·050,	„ „	·078
120	„ „	·050,	„ „	·080

Laying down the results as found by the ten-day period, the diagram opposite shows the general run of the rainfall for the year.

The minimum, as observed, appears between the 80th and 90th days of the year, and the maximum between the 290th and 300th days, and these are the same days as found at Greenwich.

By drawing a line through the curve, giving equal weight to every point, the dotted curved line is drawn: if we consider this to represent the annual march of the fall of rain, it seems that the minimum is from the 80th to the 90th days; that it increases gradually, but with checks, to a maximum about the 220th day, decreases a little after this, attains the maximum between the 290th and 300th days; then rapidly decreases towards the end of the year, when a secondary minimum takes place, and increases to a winter maximum about the middle of January, agreeing in all its main characters with the results as found at Greenwich from fifty-five years' observations.

and 4-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-

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